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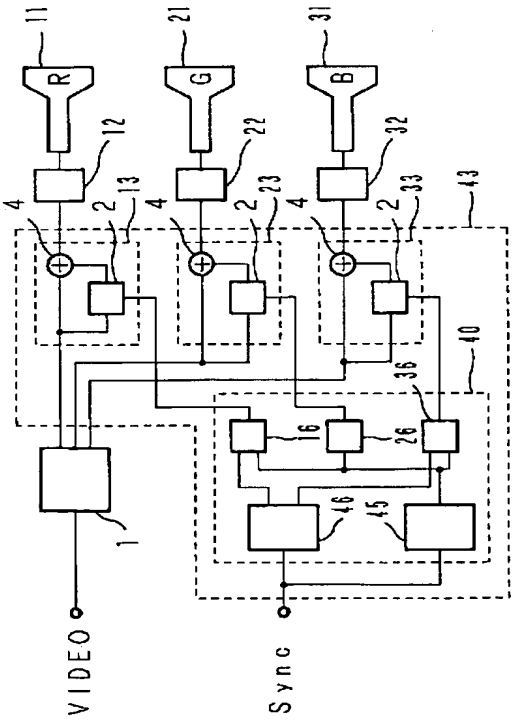
(54)【発明の名称】　ユニフォミティ回路

(57)【要約】

【目的】　Ｒ，Ｂの残留色むらの補正と画面周辺部の輝度補正を行なうことで、ビデオプロジェクターのユニフォミティの向上をおこなう。

【構成】　主偏向と同期した水平、垂直同期信号から水平、垂直周期の色むら補正波形信号（Ｈは３次、Ｖは２次波形）及び輝度補正波形信号（Ｈ，Ｖとも２次波形）を作成し、これらの補正波形信号からＲ，Ｇ，Ｂそれぞれの補正波形信号（Ｒ，Ｂは色むら、輝度の両補正、Ｇは輝度補正のみ）を作成する。次にＲ，Ｇ，Ｂ原色信号をＲ，Ｇ，Ｂそれぞれの補正波形信号で変調する。補正波形信号で変調された原色信号はＣＲＴドライブ回路で増幅されてＣＲＴ蛍光面に写され、ＣＲＴ前面に設置された投写レンズでスクリーンに拡大投写する。スクリーンに投写される映像は光出力が色むら、輝度補正されているので、色むらの低減と画面周辺部の輝度改善がされる。



【特許請求の範囲】

【請求項１】　Ｒ，Ｇ，Ｂ３本のＣＲＴにそれぞれＲ，Ｇ，Ｂ単色映像を写し、その映像を３本の投写レンズによってスクリーン上に拡大投写してカラー映像を得るＣＲＴ方式リア型ビデオプロジェクター、またはＣＲＴ方式フロント投写型ビデオプロジェクターのビデオ回路において、Ｒ，Ｂの原色信号の色むら補正波形信号発生手段と、Ｒ，Ｇ，Ｂ三原色信号の輝度補正波形信号発生手段と、上記両補正波形発生手段の出力補正波形信号からＲ，Ｇ，Ｂ三原色のそれぞれの補正波形信号を作成する手段と、上記補正波形信号作成手段の出力信号からＲ，Ｇ，Ｂ原色信号のビデオ補正信号を作成する手段と、上記Ｒ，Ｇ，Ｂの各ビデオ補正信号作成手段の出力信号とＲ，Ｇ，Ｂ三原色信号との加算によってＲ，Ｇ，Ｂ三原色信号の補正を行う手段を備えたビデオ回路によって構成したことを特徴とするユニフォミティ回路。

【請求項２】　Ｒ，Ｇ，Ｂ３本のＣＲＴにそれぞれＲ，Ｇ，Ｂ単色映像を写し、その映像を３本の投写レンズによってスクリーン上に拡大投写してカラー映像を得るＣＲＴ方式リア型ビデオプロジェクター、またはＣＲＴ方式フロント投写型ビデオプロジェクターのビデオ回路において、Ｒ，Ｂの原色信号の色むら補正波形信号発生手段と、Ｒ，Ｇ，Ｂ三原色信号の輝度補正波形信号発生手段と、上記両補正波形発生手段の出力補正波形信号からＲ，Ｇ，Ｂ三原色のそれぞれの補正波形信号を作成する手段と、上記補正波形信号作成手段の出力信号からＲ，Ｇ，Ｂの補正信号を作成する手段と、上記Ｒ，Ｇ，Ｂの各補正信号作成手段の出力信号によってＲ，Ｇ，Ｂ三原色信号の変調を行う手段を備えたビデオ回路によって構成したことを特徴とするユニフォミティ回路。

【請求項３】　Ｒ，Ｇ，Ｂ３本のＣＲＴにそれぞれＲ，Ｇ，Ｂ単色映像を写し、その映像を３本の投写レンズによってスクリーン上に拡大投写してカラー映像を得るＣＲＴ方式リア型ビデオプロジェクター、またはＣＲＴ方式フロント投写型ビデオプロジェクターのビデオ回路において、Ｒ，Ｂの原色信号の色むら補正波形信号発生手段と、Ｒ，Ｇ，Ｂ三原色信号の輝度補正波形信号発生手段と、上記色むら補正波形信号発生手段の出力信号でＲ，Ｂ原色信号を変調を行う手段と、上記Ｒ，Ｂの輝度補正波形信号発生手段の出力信号でＲ，Ｂの上記色むら補正変調手段の出力信号を変調する手段と、上記Ｇの輝度補正波形信号発生手段の出力信号でＧの原色信号を変調を行う手段を備えたビデオ回路によって構成したことを特徴とするユニフォミティ回路。

【請求項４】　Ｒ，Ｇ，Ｂ３本のＣＲＴにそれぞれＲ，Ｇ，Ｂ単色映像を写し、その映像を３本の投写レンズによってスクリーン上に拡大投写してカラー映像を得るＣＲＴ方式リア型ビデオプロジェクター、またはＣＲＴ方式フロント投写型ビデオプロジェクターにおいて、Ｒ，Ｇ，Ｂ三原色信号の輝度補正波形信号発生手段と、上記

輝度補正波形信号発生手段の出力信号でＲ，Ｇ，Ｂ三原色信号をそれぞれ変調する手段を備えたビデオ回路と、Ｒ，Ｂ原色信号の色むら補正波形信号発生手段と、Ｒ，Ｂ用の２本のＣＲＴのＧ１に上記輝度補正波形信号発生手段の出力信号を与えるためのＧ１駆動回路によって構成したことを特徴とするユニフォミティ回路。

【請求項５】　Ｒ，Ｇ，Ｂ３本のＣＲＴにそれぞれＲ，Ｇ，Ｂ単色映像を写し、その映像を３本の投写レンズによってスクリーン上に拡大投写してカラー映像を得るＣＲＴ方式リア型ビデオプロジェクター、またはＣＲＴ方式フロント投写型ビデオプロジェクターのビデオ回路において、Ｒ，Ｇ，Ｂ原色信号に復調する前のビデオ信号を変調するための輝度補正波形信号の発生手段と、上記信号発生手段の出力信号で復調前のビデオ信号の変調を行う手段と、上記変調手段の出力ビデオ信号をＲ，Ｇ，Ｂ原色信号に復調するマトリクス回路と、Ｒ，Ｂ原色信号の色むら補正波形信号発生手段と、上記色むら補正波形信号発生手段の出力信号でＲ，Ｂ原色信号を変調する手段とを備えたビデオ回路により構成したことを特徴とするユニフォミティ回路。

【請求項６】　Ｒ，Ｇ，Ｂ３本のＣＲＴにそれぞれＲ，Ｇ，Ｂ単色映像を写し、その映像を３本の投写レンズによってスクリーン上に拡大投写してカラー映像を得るＣＲＴ方式リア型ビデオプロジェクター、またはＣＲＴ方式フロント投写型ビデオプロジェクターのビデオ回路において、Ｒ，Ｇ，Ｂ原色信号に復調する前のビデオ信号をデジタルビデオ信号に変換する手段と、Ｒ，Ｇ，Ｂ原色信号への復調処理、Ｒ，Ｂ原色信号の色むら補正処理、及びＲ，Ｇ，Ｂ三原色信号の輝度補正信号処理をデジタルビデオ信号の演算処理により行う演算処理手段と、デジタルＲ，Ｇ，Ｂ原色信号をアナログＲ，Ｇ，Ｂ原色信号に変換する手段を備えたビデオ回路により構成したことを特徴とするユニフォミティ回路。

【請求項７】　１本のカラーＣＲＴにカラー映像を写し、その映像を１本の投写レンズによってスクリーン上に拡大投写してカラー映像を得る１レンズ方式１ＣＲＴ方式リア型ビデオプロジェクター、または１ＣＲＴ方式フロント投写型ビデオプロジェクター、または１枚の液晶パネルにカラー映像を写し、その映像を１本の投写レンズによってスクリーン上に拡大投写してカラー映像を得る１レンズ方式液晶方式リア型ビデオプロジェクター、またはフロント投写型ビデオプロジェクターのビデオ回路において、Ｒ，Ｇ，Ｂ三原色信号の輝度補正波形信号発生手段と、上記補正波形信号発生手段の出力信号でＲ，Ｇ，Ｂ三原色信号を変調する手段を備えたビデオ回路によって構成したことを特徴とするユニフォミティ回路。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、３レンズＣＲＴ方式、

１レンズＣＲＴ方式、３レンズ液晶方式、または１レンズ液晶方式によるリア型、またはフロント型ビデオプロジェクターの画質改善回路の一つである色むら補正及び輝度補正回路によるユニフォミティ回路に関するものである。

【０００２】

【従来の技術】ＣＲＴ方式ビデオプロジェクターは、リア型、フロント型にかかわらず、Ｒ、Ｇ、Ｂの単色小型ＣＲＴに投写した単色映像をＣＲＴ蛍光面の前面に設置された３本の投写レンズにより、大画面スクリーンに拡大投影して、スクリーン上でカラー映像を合成して得ている。このため、光学系各パーツ（１本の投写レンズを構成する複数枚の投写レンズ）の影響や、Ｒ，Ｇ，ＢのＣＲＴのセットへの取り付け角度の違い（集中角の違い）、各ＣＲＴのスクリーンまでの投写距離の違いによりスクリーン上で光学的にＲ，Ｇ，Ｂの光量むらが発生する。Ｒ，Ｇ，Ｂの光量むらが発生すると、ホワイトラスターをスクリーンに写した時、Ｒの光量が多い部分では白が赤っぽくなり、逆にＢの光量が多い部分では白が青っぽくなり、スクリーン上で白が均一に再現されなくなる。上記の状態を色むらという。色むらが１０％程度発生（スクリーン上で１０％程度色むらが残っている状態）すると、プロジェクターの視聴者は色むらを感じる。

【０００３】以上のように光学的に発生する色むらに関しては、従来は、色むらが少なくなるように光学系の設計を行って色むらの発生量（スクリーン上の残留色むら）が小さくなるようにしていた。しかし、光学系の設計だけでは残留色むら量をゼロにはできず、それでも残る残留色むらについては、放置していてその対策は行われていなかった。この時の最大残留色むら量は１０～１５％程度である。しかし、近年、リア型ビデオプロジェクターの奥行きの薄型化に伴って光学的投写距離（投写レンズ・スクリーン間距離）が短縮されたことにより、色むら低減光学系を用いてもスクリーン上の残留色むら量が従来の光学系を用いた場合よりも大きくなり、（１５％～２５％程度残留色むらが発生する。）この対策が必要になってきた。

【０００４】図１８は従来の光学系（色むら対策なし）を用いたビデオプロジェクターにおいて、スクリーン上におけるＧの照度分布に正規化したＲの照度分布の比率の一例を示した図である。同図中では、水平方向のＲの照度分布比率は画面中央縦軸（Ｙ軸）上の点を基準点にして図示している。この時、水平方向に照度分布を観察すると、スクリーンの左端が最も赤っぽくなり、右端が最も青っぽくなる。また、垂直方向に照度分布を観察するとスクリーンの上端及び下端部では残留色むら量が最も大きく観察される。この原因はＲ，ＢのＣＲＴはＧのＣＲＴに対して集中角αをもって設置されているため、Ｒ，Ｂの投写レンズからスクリーン左右端までの光学的

距離が異なり、投写距離がスクリーン左右端で異なるためである。同様に垂直方向の照度分布むらはＣＲＴが仰角θをもって設置されているため、スクリーン上端と下端までの投写距離が異なるためである。なお、ＲとＢのＣＲＴはＧのＣＲＴを対称軸として設置されているため、ＲとＢのスクリーン上の照度分布は左右逆になり、Ｂの照度分布はスクリーン左端で最も低下し、右端で最も上昇する。なお、垂直方向は３本のＣＲＴとも同一角度（仰角）で設置されているため、Ｒ，Ｂの垂直照度分布は同じ分布になる。

【０００５】また、図１９は残留色むらを低減するように設計された光学系を用いたビデオプロジェクターにおけるスクリーン上におけるＧの照度分布に正規化したＲの照度分布の比率の一例を示した図であり、図１８と同様にＹ軸上の点を基準に示している。また、Ｂの分布は従来光学系と同様にＲの分布をＹ軸を対称にしたように左右逆になって分布する。このため、スクリーンの左側半分が赤っぽくなり、右側半分が青っぽくなるがスクリーン左右両端の残留色むらはほとんど認められない。また、垂直方向で観察するとスクリーン中央部に近づくほど残留色むら量が大きくなり、画面中央横軸（Ｘ軸）上で最大になる。しかし、この光学系はＲ，Ｂの投写レンズのスクリーン左右端の画角が等しくなるように、投写レンズの軸をずらした軸ずらし光学系を用いたためこのようになる。尚、この光学系による残留色むらの最大量は従来光学系による残留色むら最大量より小さくなり、その残留量は１０％程度になる。（４５”リア型プロジェクターで投写レンズ・スクリーン間距離が約８００ｍｍの場合。）しかし、セット奥行きをさらに薄型化すると、上記投写距離が更に短縮して、スクリーン上の残留色むら量は現在よりも大きくなる。

【０００６】ここで、図１７にユニフォミティ回路を含まない従来のビデオ回路の構成ブロック図を示す。同図において、１は入力されたビデオ信号をＲ，Ｇ，Ｂ原色信号に復調するビデオマトリクス回路、１１、２１、３１はＲ，Ｇ，Ｂの映像を写す小型ＣＲＴ、１２、２２、３２はＣＲＴ１２、２１、３１を駆動するための出力回路である。

【０００７】次に、動作について簡単に述べる。ビデオ信号は、コンポジット信号、またはＹ／Ｃ信号でビデオ回路に入力される。ビデオ回路に入力されたビデオ信号は、ビデオマトリクス回路１のマトリクスでＲ，Ｇ，Ｂの原色信号に復調される。そして、Ｒ，Ｇ，Ｂそれぞれの原色信号はそれぞれの出力段１２、２２、３２に送られ、Ｒ，Ｇ，ＢそれぞれのＣＲＴ１１、２１、３１を駆動してＣＲＴ蛍光面上にＲ，Ｇ；Ｂの単色映像（ラスター）が写し出される。ＣＲＴ蛍光面上に写された映像はその光出力がＣＲＴ前面に設置された投写レンズ（図示せず）によってスクリーンにそれらの単色映像が拡大投写され、スクリーン上で光学的にＲ，Ｇ，Ｂの合成が行

われることによってカラー映像が得られる。

【０００８】いま、ホワイトラスター信号がプロジェクターのビデオ回路に入力された場合を考えると、Ｒ，Ｇ，ＢそれぞれのＣＲＴ１１、２１、３１の蛍光面上のラスターの任意の位置で、電子ビーム電流密度は等しくなるため、Ｒ，Ｇ，ＢそれぞれのＣＲＴ蛍光面上のラスターの輝度は等しくなるが、投写レンズは$\cos^4$法則により画角の大きくなる画面周辺部の輝度が低下する性質があり、これが原因でスクリーン上の映像の輝度は一定ではなく、画面周辺部の輝度が低下する。（周辺・センター輝度比の低下）従来のリア型ビデオプロジェクターにおいては、周辺・センター輝度比は２０～３０％程度であった。（投写レンズの全画角が約５４°である従来のリア型プロジェクターの場合。）

【０００９】

【発明が解決しようとする課題】リア型ビデオプロジェクターの奥行きの薄型化に伴って、投写レンズとスクリーン間の投写距離が短縮化することが原因で投写レンズの画角が従来のプロジェクターの投写レンズの画角よりも更に拡大する。この結果、画面周辺部の輝度が従来よりも更に低下して、周辺・センター輝度比も従来のビデオプロジェクターと比べて更に低下する。例えば、全画角が８０°となるリア型プロジェクターでは、スクリーン上の画面周辺輝度は、全画角が５４°の従来のプロジェクターの約半分の周辺輝度しか得られなくなり、セットの周辺・センター輝度比は１０％前後まで低下する。このレベルまで周辺部の輝度が低下すると、プロジェクターの視聴者は残留色むらだけでなく、画面周辺部の輝度むら、または画面中央が明るく輝くホットスポットまでも気になるといった問題点があった。

【００１０】本発明は上記のような問題点を解消するためになされたもので、リア型ビデオプロジェクターの奥行きの薄型化に伴う投写レンズとスクリーン間の投写距離の短縮化によって発生する残留色むら量の低減をはかるとともに、投写レンズの画角の拡大が原因で発生する周辺・センター輝度比低下の改善を行い、ユニフォミティの改善を行う。また、従来のビデオプロジェクター（リア型、フロント型の両者）に用いることで、これまでは放置されていたスクリーン上の残留色むらと画面周辺部の輝度低下を補正できるユニフォミティ回路を得ることを目的とする。

【００１１】

【課題を解決するための手段】本発明に係るユニフォミティ回路は、Ｒ，Ｇ，Ｂ原色ビデオ信号を色むら補正波形信号または輝度補正波形信号、或は両者の合成補正波形信号で変調し、Ｒ，Ｇ，ＢのＣＲＴに流れるビーム電流量を制御して、ＣＲＴ蛍光面上の輝度出力を制御して、スクリーン上で均一なＲ，Ｇ，Ｂの照度分布が得られるようにすることで行なう。

【００１２】または、Ｒ，Ｇ，ＢのＣＲＴのＧ１に与える信号を、色むら補正波形信号または輝度補正波形信号、或は両者の合成補正波形信号で変調することによって、Ｒ，Ｇ，ＢそれぞれのＣＲＴに流れるビーム電流量を制御して、ＣＲＴ蛍光面上の輝度出力を制御して、スクリーン上で均一なＲ，Ｇ，Ｂの照度分布が得られるようにすることで行なう。

【００１３】あるいは、上記の２つの方法を適宜組合せることで、Ｒ，Ｇ，ＢのＣＲＴに流れるビーム電流量を制御して、ＣＲＴ蛍光面上の輝度出力を制御して、スクリーン上で均一なＲ，Ｇ，Ｂの照度分布が得られるようにすることで行なう。

【００１４】

【作用】本発明における色むら及び輝度補正波形信号は、コンバーゼンス補正と同様に水平、垂直主偏向と同期する水平、垂直周期の補正波形信号の積によって作成するので、画面位置に応じたダイナミックな色むら及び輝度補正が行うことが出来る。

【００１５】

【実施例】

実施例１．以下、本発明の一実施例を図について説明する。図１において、１は入力ビデオ信号をＲ，Ｇ，Ｂ原色信号に復調するビデオマトリクス回路、２はビデオ信号を補正波形信号で変調して補正信号を作成するための変調回路、４は補正信号と原色信号の加算を行なう加算回路、１１、２１、３１は映像を写すＲ，Ｇ，ＢのＣＲＴ、１２、２２、３２はＲ，Ｇ，ＢのＣＲＴ１２、２２、３２のドライブ回路、１３、２３、３３は変調回路２と加算回路４からなるＲ，Ｇ，Ｂ原色信号の補正を行う補正回路、１６、２６、３６はＲ，Ｇ，Ｂの補正波形信号作成回路、４５はＲ，Ｇ，Ｂの輝度補正波形信号を作成する輝度補正波形信号発生回路、４６はＲ，Ｂの色むら補正波形信号を作成する色むら補正波形信号発生回路、４０は輝度補正波形信号発生回路４５と色むら補正波形信号発生回路４６、Ｒ，Ｇ，Ｂの補正波形信号発生回路１６，２６，３６によって構成される色むら、輝度補正波形信号発生回路である。また４３はＲ，Ｇ，Ｂの補正回路１３、２３、３３と色むら、輝度補正波形信号発生回路４０からなるユニフォミティ回路である。

【００１６】次に、動作について説明する。なお、ここではビデオプロジェクターの光学系に色むら軽減光学系が用いられて、スクリーン上におけるＲの照度分布が図１５に示すようになっているとする。（Ｂの照度分布はＲの分布のＹ軸対称になる）この時、スクリーン上の輝度分布は図２０に示すようになる。ビデオマトリクス回路１では、入力ビデオ信号（コンポジット、Ｙ／Ｃ入力のどちらでもよい）がＲ，Ｇ，Ｂの原色信号に復調される。また、ビデオ回路にビデオ信号が入力されれば同時に同期信号（Ｓｙｎｃ信号）も入力される。輝度補正波形信号発生回路４５は上記同期信号に同期した水平輝度補正波形信号（水平パラボラ信号）と垂直輝度補正波形

信号（垂直パラボラ信号）を作成し、同回路内で掛け合わせることで輝度補正波形信号が作られる。また、色むら補正波形信号発生回路４６では水平色むら補正波形信号（水平３次波形）と垂直色むら補正波形信号（垂直パラボラ信号）を作成し、これらを掛け合わせてR，B用の色むら補正波形信号が作られる。なお、補正波形信号の発生方法はコンバーゼンス補正波形発生用ＩＣを用いている。

＊

$$B=(1+X)\cdot(1+Y)A \quad \cdots\cdots \text{式1}$$

$$(=A+(X+Y+XY)A) \quad \cdots\cdots \text{式1'}$$

【００１８】一方、色むら補正信号と輝度補正信号を合成して（合成補正信号をＺとする）１回の変調で補正を ※

$$C=ZA \quad \cdots\cdots \text{式2}$$

【００１９】ここで補正後に得られるＢとＣは同じものでなければならないため、式１と式２とが等しくならな ★

$$Z=(1+X)(1+Y)$$

$$=1+X+Y+XY \quad \cdots\cdots \text{式3}$$

【００２０】よって、R，Bの補正波形信号は式３からわかるように色むら補正波形信号（X）と輝度補正波形信号（Y）の積信号（XY）と両補正波形の和（X＋Y）を加えることで得られることがわかる。なお、式３の右辺にある定数１は変調を行なっていない原信号が補正後の信号に存在する（式1'のように考える。）、と考えて補正波形信号では扱わないことにする。

【００２１】R，Bの補正波形信号は、色むら補正波形信号と輝度補正波形信号の積信号と両補正波形信号の和信号を補正波形信号作成回路１６，３６で加算することで得られる。Gは輝度補正波形信号がそのままG補正波形信号作成回路２６に送られる。以上のようにして作成されたR，G，Bの補正波形信号はそれぞれR，G，Bの補正回路１３、２３、３３に送られる。

【００２２】R，G，Bの補正回路１３、２３、３３の構成は全く同じであり、この構成を図１３に示す。同図において、２は補正波形信号と原色信号とを掛け合わせて補正信号を作成するための乗算回路、４は原色信号と補正信号の加算を行う加算回路である。次に動作説明を行なう。補正後の原色信号は、式３で示したように色むら、輝度両補正波形の積と両補正波形の和を加えた波形（X＋Y＋XY）で原色信号を変調したものと原色信号を加えたものである。乗算回路２では原色信号と輝度補正波形信号（X＋Y＋XY）が掛算によって輝度補正信号が作成される。次に、上記補正信号と原色信号とが加算回路４で加算されることで補正がなされた原色信号が得られる。なおGにおいては色むら補正信号はないため、輝度補正波形信号がGの補正波形信号となるが、動作はR，Bと同じである。（以下、この原色信号の変調方法を変調方式１と呼ぶ。）変調方式１では原色信号が出力原色信号に多く含まれるため、Ｓ／Ｎへのダメージが少ない。

【００２３】なお、色むら補正及び輝度補正の補正レベルの調整はR，Bの合成補正波形信号作成時にそれぞれ色むら補正波形信号、輝度補正波形信号の振幅を制御することで行なえる。

＊【００１７】なお、R，Bについては、色むら補正と輝度補正の両者の補正波形信号を合成してR，Bの補正波形信号を作る必要がある。いま、色むら補正を補正X，輝度補正を補正Y、補正を行なう前のRまたはBのビデオ原色信号をAとすると、両補正を順番にビデオ原色信号を変調してその補正を行なうと考えると、補正後の原色信号Bは次に示す式１で表される。

※行なうと考えると、補正後の原色信号Cは次に示す式２で表される。

★ければならず、このためには次に示す式３が成立する必要がある。

【００２４】以上の様にしてR，G，Bそれぞれ色むら及び輝度補正が行われた原色信号は、出力回路１２、２２、３２に送られ、ここで増幅されて、R，G，BのＣＲＴ１１、２１、３１が駆動されて、色むら及び輝度補正が行われた映像がＣＲＴ１１、２１、３１上に映し出され、投写レンズによってスクリーン上に投写され、スクリーン上の映像は、色むらが低減され、しかも画面周辺部の輝度も補正されたユニフォミティが改善された映像になる。

【００２５】実施例２．なお、上記実施例では補正回路１３、２３、３３において、補正信号と原色信号を加算することで補正を行った原色信号を得ているが、原色信号と補正信号の加算を行なう加算回路を用いないで変調回路のみで補正を行なった原色信号（１＋X＋Y＋XY）を得る回路を構成することができ、ここではこのような実施例について述べる。この実施例における補正回路１３、２３、３３の構成を図１４に示す。その他のユニフォミティ回路の構成は実施例１で述べた回路構成となる。図１４において、３は補正波形信号と原色信号とを掛け合わせて原色信号の変調を行なう乗算回路である。ここで用いる補正信号は式３の右辺１＋X＋Y＋XYに相当し、実施例１に示した補正波形信号（X＋Y＋XY）と、この実施例の補正波形信号の違いは補正を行った原色信号が変調のみによって得られるか得られないかの違いであって、補正波形信号ではＤＣレベル（定数１があるかないか）が異なるだけで、式からもわかるように補正波形信号のＡＣ成分は同じである。また、各補正のレベル調整は補正波形信号のＡＣ成分の振幅を制御することで行える。

【００２６】この実施例に示す補正回路１３、２３、３

３では、補正回路内に加算回路が不要になるため、実施例１に示したユニフォミティ回路（変調方式１）と比べて、ユニフォミティ回路の規模が小さくなるという利点がある。（以下、この原色信号の変調方法を変調方式２という）

【００２７】実施例３．実施例１、２に示したR，G，Bの補正回路１３、２３、３３は補正回路の規模を小さくするためにR，Bの色むら、輝度補正波形信号を合成して両補正が行える補正波形を構成していたが、この場合はR，Bの補正波形信号を補正波形信号作成回路１６，３６が必要となり、ここでR，Bの補正波形信号を作成するため、補正波形信号発生回路４０が大きくなってしまう。よって、補正波形信号発生回路４０側でR，Bの合成補正波形を作らずに、補正回路１３、３３で色むら補正信号、輝度補正信号を作成して、これらを原色信号と加算するように回路を構成してもよい。このように構成したR，Bの補正回路の構成ブロック図を図１５に示す。また、補正波形信号発生回路４０はR，G，Bの補正波形信号作成回路１６、２６、３６が不要になる。なお、Gの補正は輝度補正のみであるため、実施例１、２に示した補正回路を用いることになる。（以下、このR，B原色信号の変調方法を変調方式３という）なお、各補正のレベル調整は、各補正波形信号の振幅を制御することで行う。

【００２８】実施例４．実施例３に示したR，Bの補正回路１３、３３は色むら、輝度両補正波形信号によって作成された色むら補正信号と輝度補正信号と原色信号とを加算回路４を用いて、ここで加算を行なったが、実施例２に示すように加算回路を用いずに補正回路を構成してもよい。このように構成した補正回路の実施例を図１６に示す。なお、Gの補正は輝度補正のみであるため、実施例１、２に示した補正回路を用いることになる。また、図１６ではR，Bの原色信号を色むら補正、輝度補正の順で変調を行なっているが、この変調の順番は逆であっても構わない。（以下、このR，B原色信号の変調方法を変調方式４と呼ぶ。）但し、色むら補正量よりも輝度補正量のほうが補正量が大きいため、図１６に示す手順で変調したほうが回路構成上有利である。なお、各補正のレベル調整は、各補正波形信号の振幅を制御することで行う。

【００２９】以上、述べてきたように、R，Bの補正回路は変調方式１～４の４通りの方法があり、Gの補正回路は変調方式１、２の２通りの方法がある。よって回路規模は大きくなるというデメリットが生ずるが、R，G，B原色信号の補正波形信号による変調方式は上記変調方式の中から自由に選んで組み合わせてユニフォミティ回路を構成してもよい。

【００３０】なお、R，G，Bの補正回路１３、２３、３３を上記で述べた各変調方式で構成しても、補正レベルの調整方法は、全て各補正波形信号の振幅を制御することで行える。

【００３１】実施例５．上記各実施例では色むら補正及び輝度補正をR，G，B原色信号を変調することで補正を行う場合について説明したが、図２に示すように、色むら補正は、R，B原色信号を変調し、輝度補正はR，G，BのＣＲＴ１１、２１、３１のＧ１に輝度補正波形を与えることで行ってもよい。図２において、４０は輝度補正波形信号発生回路４５と、色むら補正波形信号発生回路４６からなる補正波形信号発生回路、４４は３本のＣＲＴ１１、２１、３１のＧ１に輝度補正波形信号を与えるためのＧ１駆動回路である。また、４３はR，Bの補正回路１３、３３と補正波形信号発生回路４０、及びＧ１駆動回路４４からなるユニフォミティ回路である。なおこのように回路を構成するとGの原色信号の変調を行うGの補正回路２３が不要になる。

【００３２】また、この時のR，Bの補正回路１３、３３の回路構成は実施例１、２に示した変調方式１、２の二通りがあり、この内どちらの変調方式を用いてもよい。なお、この時の補正波形信号はR，Bともに色むら補正波形信号のみになり、補正レベルの調整はそれぞれの色むら補正波形信号の振幅を制御することで行なわれる。

【００３３】一方、R，G，BのＣＲＴ１１、２１、３１のＧ１に与える輝度補正波形（水平パラボラ波形×垂直パラボラ波形）は、色むら、輝度補正波形発生回路４０で作成され、Ｇ１駆動回路４４においてＧ１を駆動するのに必要な電圧まで増幅されて３本のＣＲＴ１１、２１、３１のＧ１に与えられる。ＣＲＴのＧ１電圧が輝度補正波形信号で変調されることで電子銃から出射される電子ビーム量は輝度補正波形信号で変調され、画面周辺部の輝度が低下する部分の電子ビーム量は増加して、ＣＲＴ蛍光面上に写されるラスターは輝度補正がなされたラスターが得られる。また、輝度補正レベルの調整はＧ１に与える輝度補正電圧の作成段で輝度補正波形信号の振幅を制御することで行なう。

【００３４】以上のようにユニフォミティ回路４３を構成することで、色むら補正と輝度補正が互いに独立して、しかも互いに干渉することなく、最適な色むら補正及び輝度補正を行なうことができ、ユニフォミティの改善が行なわれる。

【００３５】実施例６．図３に示した実施例は、色むら補正、及び輝度補正の両補正波形信号をR，G，BのＣＲＴ１１、２１、３１のＧ１に与えることでビーム電流の変調を行い、色むら、及び輝度補正を行うように構成したユニフォミティ回路である。図３において、４０は輝度補正波形信号発生回路４５、色むら補正波形信号発生回路４６、R，G，Bの補正波形信号作成回路１６、２６、３６からなる補正波形信号の発生回路、４４はR，G，BそれぞれのＣＲＴ１１、２１、３１のＧ１の駆動を行なうＧ１駆動回路、４３は上記補正波形信号発

生回路４０と上記Ｇ１駆動回路４４からなるユニフォミティ回路である。以上のようにユニフォミティ回路を構成すると、Ｒ，Ｇ，Ｂ原色信号を各色の補正波形信号で変調を行う補正回路１３、２３、３３が不要になり、従来のビデオプロジェクターで用いているビデオ回路をそのまま用いることができる。

【００３６】ここで用いる３本のＣＲＴ１１、２１、３１のＧ１に与える補正波形信号は実施例１で述べた波形と同じで、補正信号の振幅レベルが異なっているだけである。色むら補正波形信号は水平３次波形信号と垂直２次（パラボラ）波形信号の積、輝度補正波形信号は水平２次（パラボラ）波形信号と垂直２次（パラボラ）波形信号の積であり、Ｒ、Ｂは色むら、輝度補正の両補正波形の合成補正波形信号が、Ｇは輝度補正波形信号が補正波形信号となり上記補正波形信号がＧ１駆動回路４４で増幅されてそれぞれのＣＲＴ１１、２１、３１のＧ１に与えられて各補正がなされる。

【００３７】なお、色むら補正量、輝度補正量の調整は、それぞれ色むら補正波形信号、輝度補正波形信号の振幅を制御することで行うことができる。

【００３８】実施例７．図４に示す実施例では、輝度補正はＲ，Ｇ，Ｂ原色信号を輝度補正波形信号で変調することで行い、Ｒ，Ｂの色むら補正はＲ，ＢのＣＲＴ１１、３１のＧ１に色むら補正波形信号を与えることで補正を行うように構成したユニフォミティ回路である。図４において、４０は輝度補正波形信号発生回路４５と色むら補正波形信号発生回路４６からなる補正波形信号発生回路、４３は補正波形信号発生回路４０とＲ，ＢのＣＲＴ１１、３１のＧ１駆動回路４４、及び、Ｒ，Ｇ，Ｂ原色信号を輝度補正波形信号で変調する補正回路１３、２３、３３からなるユニフォミティ回路である。

【００３９】輝度補正波形信号の変調方式は実施例１、２で述べた変調方式１、２の二通りがあるが、どちらの方式を用いても構わない。また、補正レベルの調整は輝度補正波形信号の振幅、及びＲ，Ｂの色むら補正波形信号の振幅を制御することで、それぞれ独立して調整が行える。

【００４０】実施例８．図５に示す実施例では、Ｒ，Ｇ，Ｂ原色信号を色むら及び輝度補正波形信号でそれぞれ別に変調して補正を行う様に構成したユニフォミティ回路である。図５において、４０は輝度補正波形信号発生回路４５と色むら補正波形信号発生回路４６からなる補正波形信号発生回路、４３は補正波形信号発生回路４０と、Ｒ，Ｂの補正回路１３、３３及びＧの補正回路２３からなるユニフォミティ回路である。なお、Ｒ，Ｂの補正回路１３、３３は色むら補正回路４１と輝度補正回路４２で構成されており（補正回路の設置順番は図５に示す以外であってもよい。）、Ｇの補正回路２３は輝度補正回路４２で構成されている。この時、色むら補正回路４１と輝度補正回路４２は、変調方式１、２の二通りがあるがどちらの方式であっても構わない。

【００４１】なお、この実施例に示したようにユニフォミティ回路を構成すると、Ｒ，Ｇ，Ｂで合計５ＣＨの変調回路を設ける必要があるが、それら５ＣＨを全く同じ構成とすることができるため、補正レベルの調整方法や回路調整方法が全て同じになり、調整者は簡単に調整することが出来る。なお、色むら、輝度補正レベルの調整は５ＣＨの各変調回路に入力される色むら、または輝度補正波形信号の振幅を制御することで行なう。

【００４２】実施例９．図６に示す実施例では、ビデオマトリクス回路１に入力する前のビデオ信号（コンポジット、Ｙ／Ｃ入力のどちらでもよい）の輝度信号を輝度補正波形信号で変調することで、Ｒ，Ｇ，Ｂ原色信号に復調する前に輝度補正処理を行い、次にビデオマトリクス回路１でＲ，Ｇ，Ｂ原色信号に復調し、Ｒ，Ｂ原色信号については、色むら補正波形信号で変調することで色むら及び輝度補正を行なうように構成したユニフォミティ回路である。以上のように構成すると、Ｒ，Ｇ，Ｂ原色信号に復調された時点で既に輝度補正は完了しているため、Ｇ原色信号はそのまま出力段２２に導くことができるため、Ｇの補正回路１３は不要になる。なお、図６において、４５は輝度補正波形信号発生回路、４６は色むら補正波形信号発生回路であり、４０は輝度補正波形信号発生回路４５と色むら補正波形信号発生回路４６から構成されている。また、４２はＲ，Ｇ，Ｂ原色信号に復調する前のビデオ信号を輝度補正波形信号で変調する輝度補正回路、４３は補正波形信号発生回路４０と輝度補正回路４２、及びＲ，Ｂの補正回路１３、３３からなるユニフォミティ回路である。

【００４３】以上のようにユニフォミティ回路を構成すると、ビデオ信号がコンポジット信号で入力された場合はコンポジット信号をＹ／Ｃ分離した後でＹ信号を変調し、一方、Ｙ／Ｃ信号で入力された場合はＹ信号をそのまま変調すことで、輝度補正用の変調回路が１組で済み、Ｒ，Ｂの色むら補正用変調回路１３、３３と合わせて全体で３組の補正用変調回路で済むため、ユニフォミティ回路の回路規模の縮小化が行える。また、色むら、及び輝度補正レベルの調整方法は上記各実施例と同様に、色むら、輝度補正波形信号の振幅を制御することで行う。

【００４４】また、図６に示した実施例では、Ｒ，Ｂの色むら補正をＲ，Ｂ原色信号を変調する方法を用いているが、Ｒ，Ｂの色むら補正はＲ，ＢのＣＲＴのＧ１に色むら補正波形信号を与えて補正を行うこともできる。この場合はＲ，Ｂの補正回路１３、３３が不要になり、実施例６に示したような構成になる。ユニフォミティ回路４３は補正波形発生回路４０と輝度補正回路４２、及びＲ，ＢのＧ１駆動回路４４から構成され、上記実施例と同様の効果が得られる。また、補正レベルの調整方法も上記各実施例と同じである。

【００４５】実施例１０．図７に示す実施例では、ビデオマトリクス回路１に入力する前の復調されていないアナログビデオ信号をＡ／Ｄ変換回路５１でデジタル変換し、デジタルビデオ信号をデジタル演算によってＲ，Ｇ，Ｂ原色信号への復調と、色むら及び輝度補正処理を行い、色むら、輝度補正を行なったデジタルＲ，Ｇ，Ｂ原色信号をＤ／Ａ変換回路５３で、再度アナログ原色信号に変換することで色むら、輝度補正を行なうように構成したユニフォミティ回路である。また、デジタル信号処理回路５２のソフトウェアをブライト、コントラストなど各種画質調整も演算によって処理を行なえるようにすることで、ビデオ回路のフルデジタル化がおこなえる。図７において、５１は入力アナログビデオ信号をデジタルビデオ信号に変換するＡ／Ｄ変換回路、５２はＲ，Ｇ，Ｂ復調及び色むら、輝度補正演算、各種画質調整演算を行うビデオ信号処理回路、５３はＲ，Ｇ，Ｂデジタル原色信号をアナログ原色信号に変換するＤ／Ａ変換回路であり、５１、５２、５３で、ユニフォミティ回路４３を構成する。

【００４６】この実施例では、色むら及び輝度補正をデジタル演算処理によってビデオ信号の変調を行うため、ビデオ回路の回路規模は大きくなるが、Ｒ，Ｇ，Ｂそれぞれ異なる補正波形で色むら及び輝度補正が行えるだけでなく、同じ色でも一台一台異なる量産セットのＲ，Ｇ，Ｂの照度分布のばらつきに対しても、それぞれの色で一台一台最適補正を行うことが出来、量産セットのユニフォミティの向上が行える。なお、色むら、輝度補正のレベル調整はデジタル演算時に補正係数を可変させることで行える。

【００４７】実施例１１．以上これまで述べてきた上記各実施例１～１０は、リア型３レンズ方式ＣＲＴ方式ビデオプロジェクターにおけるユニフォミティ回路として述べてきたが、フロント型３レンズ方式ＣＲＴ方式ビデオプロジェクターに用いることも出来る。フロント型３レンズ方式ＣＲＴ方式ビデオプロジェクターでもリア型３レンズ方式ビデオプロジェクターと同様に、投写レンズの影響でスクリーン上で残留色むらが発生し、また画面周辺部ではセンター輝度に比べて輝度低下が起こる。よって、ユニフォミティ回路を用いることで残留色むらの低減と周辺輝度低下の改善が達成でき、ユニフォミティの向上が達成出来る。また、補正レベルの調整方法もリア型プロジェクターである上記各実施例と同じである。

【００４８】実施例１２．上記各実施例の内、色むら補正及び輝度補正をＲ，Ｇ，Ｂ原色信号の変調によって行なう実施例１～４、８～１０に示したユニフォミティ回路を用いれば、液晶パネルを用いた３レンズ方式液晶ビデオプロジェクターにおいて、投写レンズの影響でスクリーン上で発生する残留色むら、及び画面周辺部の輝度低下の改善を行なうことができ、３レンズ方式液晶リア型、及び３レンズ方式液晶フロント型プロジェクター双方でスクリーンに投写した映像のユニフォミティの向上が達成出来る。なお、ユニフォミティ回路４３の構成は、図１、５、６、７において示したＲ，Ｇ，ＢのＣＲＴ１１、２１、３１をそれぞれＲ，Ｇ，Ｂの液晶パネル１４、２４、３４に、出力回路１２、２２、３２をそれぞれ液晶パネル駆動回路１５、２５、３５に置き換えるだけで、その他の構成は上記実施例を示した各図に示した構成のままでよい。

【００４９】実施例１３．図８は本発明による１レンズ方式液晶プロジェクターにおけるビデオ回路を含むユニフォミティ回路の実施例のブロック図であり、同図において、１４、２４、３４はＲ，Ｇ，Ｂの映像をつくるＲ，Ｇ，Ｂそれぞれの液晶パネル、１５、２５、３５はＲ，Ｇ，Ｂそれぞれの液晶パネル１４、２４、３４の駆動回路でＣＲＴ方式プロジェクターではＲ，Ｇ，Ｂの出力回路１２、２２、３２に相当する回路であり、４５は輝度補正波形信号発生回路である。また、ユニフォミティ回路４３は輝度補正波形信号発生回路４５と補正回路１３、２３、３３によって構成される。

【００５０】１レンズ方式プロジェクターでは、Ｒ，Ｇ，Ｂの単色ラスターを投写する前に合成してカラー映像を得て、後に、スクリーンにそのカラー映像を拡大投写している。よって、スクリーンに対してＲ，Ｇ，Ｂの光源（液晶パネル）は同一条件で設置されるため、集中角の影響によるＧの照度に対するＲ，Ｂのスクリーン上の照度むらは原理的に発生しない。よって、色むらは発生しない。一方、投写レンズの画角の影響のため、画面周辺部の映像の輝度は低下する。よって、１レンズ方式プロジェクターでは、ＣＲＴ方式、液晶方式に関係なく、また、リア型、及びフロント型プロジェクターに関係なく、色むら補正回路は不要になり、輝度補正のみが必要となる。このため、本発明のユニフォミティ回路は輝度補正回路のみで構成されている。

【００５１】以上から、図８に示した実施例のユニフォミティ回路は輝度補正波形信号発生回路４５の出力補正信号でＲ，Ｇ，Ｂ原色信号の変調を行い、液晶パネル１４、２４、３４で映像を写している。Ｒ，Ｇ，Ｂの変調回路１３、２３、３３の構成は前述の変調方式１、２の二通りがあるが、どちらの変調方式を用いてもかまわない。また、輝度補正のレベル調整は輝度補正波形信号の振幅を制御することで行なわれる。以上の結果、画面周辺部の輝度が補正され、画面中心部にホットスポットなどがなくなり、プロジェクターの画質改善が達成される。

【００５２】また、図８に示した本発明の実施例において、Ｒ，Ｇ，Ｂの液晶パネル１４、２４、３４をＲ，Ｇ，ＢのＣＲＴ１１、２１、３１に、また、液晶パネル駆動回路１５、２５、３５をＣＲＴ用出力回路１２、２２、３２に置き換えて、１レンズ方式ＣＲＴプロジェク

ターに用いた本発明の実施例のユニフォミティ回路を含むビデオ回路の構成を示すブロック図が図１０である。動作については上記１レンズ方式液晶プロジェクターと同様にR，G，B原色信号を輝度補正波形信号で変調している。調整方法は上記各実施例と同様に行ない、上記１レンズ方式液晶プロジェクターと同様にスクリーン上に投写された映像の画面周辺部の輝度低下を改善することができ、１レンズ方式液晶プロジェクターと同様の効果を得ることができる。

【００５３】実施例１４．図９は本発明による１レンズ方式液晶プロジェクターにおけるビデオ回路を含むユニフォミティ回路の他の実施例のブロック図であり、同図において、ユニフォミティ回路４３は、輝度補正波形信号発生回路４５とビデオ信号（Y信号）の変調を行なう輝度補正回路４２で構成される。なお、この実施例は、実施例９で述べたユニフォミティ回路を１レンズ方式プロジェクターに応用したものである。この例に示したユニフォミティ回路では、ビデオマトリクス回路１に入力する前のビデオ信号（コンポジット、Y／C入力のどちらでもよい。コンポジット信号では輝度補正を行なう前にY／C分離を行なっておく。）の輝度信号（Y信号）を輝度補正波形信号で変調することで、R，G，Bに復調する前に輝度補正の処理を行い、次にビデオマトリクス回路１でR，G，B原色信号に復調して、映像を得るように構成したものである。上記のようにユニフォミティ回路を構成すると、R，G，B原色信号に復調された時点で既に輝度補正の処理は完了しているため、３色の原色信号はそのまま出力段に導くことができ、R，G，Bの原色信号の変調を行なう補正回路１３、２３、３３は不要になる。

【００５４】以上のようにユニフォミティ回路を構成すると、実施例９で述べたように、輝度補正用変調回路が１組で済むため、ユニフォミティ回路の回路規模が小さくなるというメリットが生じる。また、輝度補正レベルの調整方法は上記各実施例と同様に、輝度補正波形信号の振幅を制御することで行うことができる。更に、このユニフォミティ回路を用いた液晶プロジェクターはリア型、フロント型プロジェクターの双方に適用できる。

【００５５】また、図９は１レンズ方式液晶プロジェクターに用いた例を示しているが、１レンズ方式ＣＲＴプロジェクターでも、図９の液晶パネル１４、２４、３４をR，G，BのＣＲＴ１１、２１、３１に、液晶パネル駆動回路１５、２５、３５をＣＲＴ出力回路１２、２２、３２に置き換えることで、リア型、フロント型液晶プロジェクターと全く同じ効果が得られる。

【００５６】実施例１５．図１１に示したユニフォミティ回路の実施例は、実施例６で述べたユニフォミティ回路を１レンズ方式ＣＲＴプロジェクターに応用したものであり、同図はその実施例におけるビデオ回路を含むユニフォミティ回路のブロック図である。同図において、ユニフォミティ回路４３は、輝度補正波形信号発生回路４５と、R，G，BのＣＲＴのＧ１駆動回路４４で構成される。このユニフォミティ回路は実施例６で述べたようにR，G，Bの原色信号の変調を行なう補正回路１３、２３、３３が不要になり、従来のプロジェクターで用いているビデオ回路をそのまま用いることができ、上記各実施例と同様にリア型、フロント型プロジェクターで周辺・センター輝度比の改善が達成される。

【００５７】実施例１６．これまでは、３レンズ、または１レンズ方式で、R，G，B映像を写す素子として、３本のＣＲＴ、または３枚の液晶パネルを用いたリア型、またはフロント型プロジェクターのユニフォミティ回路について述べてきたが、プロジェクターにはこれらの他に、１本のカラーＣＲＴや、１枚の液晶パネルに映像を写してその映像を１本の投写レンズでスクリーン上に拡大投写するリア型、フロント型プロジェクターもある。これらのプロジェクターにおいても、３ＣＲＴ、３液晶パネルプロジェクターと全く同様に、投写レンズの影響で画面周辺部の輝度が低下する。しかし、色むらは原理的に発生しない。よって、これらのプロジェクターにおいても、実施例１３～１５で述べた１レンズ方式プロジェクターのユニフォミティ回路を構成して用いることで、輝度補正を行い、スクリーン上でホットスポットがなくなり、スクリーン上の映像のユニフォミティ改善が達成できるプロジェクターが得られる。

【００５８】なお、これらのプロジェクターおけるユニフォミティ回路の構成は、液晶方式プロジェクターでは図８、９に示したR，G，Bの液晶パネル１４、２４、３４１枚のカラー液晶パネルに置き換えるだけでよい。一方、ＣＲＴ方式プロジェクターでは図１０、１１において、R，G，BのＣＲＴ１１、２１、３１を１本のカラーＣＲＴに置き換えればよい。

【００５９】輝度補正レベルの調整方法についても、上記各実施例と同様に、輝度補正波形信号の振幅を制御することで行うことができる。

【００６０】実施例１７．ＣＲＴ方式のプロジェクターでは、輝度補正を行なう方法として、ＣＲＴのＧ１に輝度補正波形信号を与える方法もあるが、１ＣＲＴのプロジェクターでも同様にＣＲＴのＧ１によるユニフォミティ回路を構成することが出来る。この時の実施例を図１２に示す。同図において、６１はカラー映像を写すＣＲＴ、６２はR，G，Bビデオ信号の出力回路であり、４３は輝度補正波形信号発生回路４５とＧ１駆動回路４４からなるユニフォミティ回路である。なお、輝度補正レベルの調整方法についても、上記各実施例と同様に、輝度補正波形信号の振幅を制御することで行うことができ、上記各実施例と同様の効果が得られる。

【００６１】

【発明の効果】以上のように、本発明のユニフォミティ回路を用いることで、スクリーン上で発生するR，Bの

残留色むら量を低減することができるとともに、周辺・センター輝度比を改善し、ユニフォミティの改善を達成することのできる３レンズＣＲＴ方式、または３レンズ液晶方式のリア型、及びフロント型ビデオプロジェクターを得られる効果がある。また、１レンズＣＲＴ方式、または１レンズ液晶方式のリア型、及びフロント型ビデオプロジェクターでは、周辺・センター輝度比を改善し、ユニフォミティの改善を達成することのできるプロジェクターを得られる効果がある。

【図面の簡単な説明】

【図１】本発明の第１の実施例による３レンズ方式プロジェクター用ユニフォミティ回路を含んだビデオ回路の構成を示すブロック図である。

【図２】本発明の第２の実施例による３レンズ方式プロジェクター用ユニフォミティ回路を含んだビデオ回路の構成を示すブロック図である。

【図３】本発明の第３の実施例による３レンズ方式プロジェクター用ユニフォミティ回路を含んだビデオ回路の構成を示すブロック図である。

【図４】本発明の第４の実施例による３レンズ方式プロジェクター用ユニフォミティ回路を含んだビデオ回路の構成を示すブロック図である。

【図５】本発明の第５の実施例による３レンズ方式プロジェクター用ユニフォミティ回路を含んだビデオ回路の構成を示すブロック図である。

【図６】本発明の第６の実施例による３レンズ方式プロジェクター用ユニフォミティ回路を含んだビデオ回路の構成を示すブロック図である。

【図７】本発明の第７の実施例による３レンズ方式プロジェクター用ユニフォミティ回路を含んだビデオ回路の構成を示すブロック図である。

【図８】本発明の第８の実施例による１レンズ方式液晶プロジェクター用ユニフォミティ回路を含んだビデオ回路の構成を示すブロック図である。

【図９】本発明の第９の実施例による１レンズ方式液晶プロジェクター用ユニフォミティ回路を含んだビデオ回路の構成を示すブロック図である。

【図１０】本発明の第１０の実施例による１レンズ方式ＣＲＴプロジェクター用ユニフォミティ回路を含んだビデオ回路の構成を示すブロック図である。

【図１１】本発明の第１１の実施例による１レンズ方式ＣＲＴプロジェクター用ユニフォミティ回路を含んだビデオ回路の構成を示すブロック図である。

【図１２】本発明の第１２の実施例による１レンズ方式ＣＲＴプロジェクター用ユニフォミティ回路を含んだビデオ回路の構成を示すブロック図である。

【図１３】本発明におけるＲ，Ｇ，Ｂのビデオ補正回路の原色信号変調段の構成の第１の例を示す図である。

【図１４】本発明におけるＲ，Ｇ，Ｂのビデオ補正回路の原色信号変調段の構成の第２の例を示す図である。

【図１５】本発明におけるＲ，Ｂのビデオ補正回路の原色信号変調段の構成の第３の例を示す図である。

【図１６】本発明におけるＲ，Ｂのビデオ補正回路の原色信号変調段の構成の第４の例を示す図である。

【図１７】従来のＣＲＴプロジェクターで用いられているユニフォミティ回路のないビデオ回路の構成を示すブロック図である。

【図１８】従来のリア型ビデオプロジェクターにおいて、従来の光学系を用いた時のスクリーン上におけるＧの照度に正規化したＲの照度分布を示す図である。

【図１９】従来のリア型ビデオプロジェクターにおいて、残留色むらの軽減を行った光学系を用いた時のスクリーン上におけるＧの照度に正規化したＲの照度分布を示す図である。

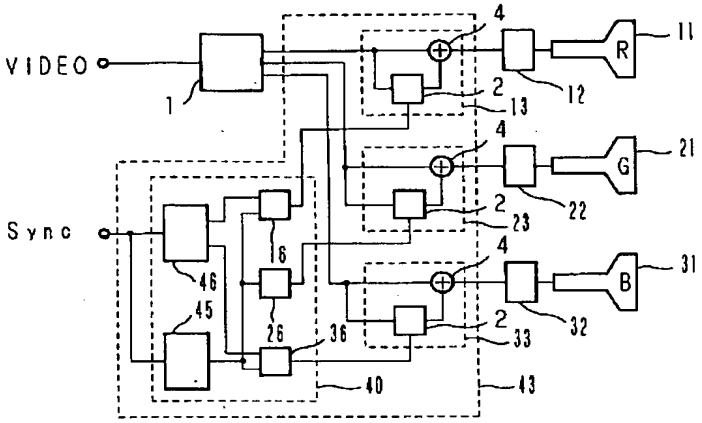
【図２０】従来のリア型ビデオプロジェクターにおいて、スクリーン上の輝度分布を示す図である。

【符号の説明】

１　ビデオマトリクス回路
２　乗算回路（補正信号作成用）
３　乗算回路（原色信号変調用）
４　加算回路
１１　Ｒ－ＣＲＴ
１２　Ｒ出力回路
１３　Ｒ補正回路
１４　Ｒ－液晶パネル
１５　Ｒ－液晶パネル駆動回路
１６　Ｒ補正波形信号作成回路
２１　Ｇ－ＣＲＴ
２２　Ｇ出力回路
２３　Ｇ補正回路
２４　Ｇ－液晶パネル
２５　Ｇ－液晶パネル駆動回路
２６　Ｇ補正波形信号作成回路
３１　Ｂ－ＣＲＴ
３２　Ｂ出力回路
３３　Ｂ補正回路
３４　Ｂ－液晶パネル
３５　Ｂ－液晶パネル駆動回路
３６　Ｂ補正波形信号作成回路
４０　色むら、輝度補正波形信号発生回路
４１　色むら補正回路
４２　輝度補正回路
４３　ユニフォミティ回路
４４　Ｇ１駆動回路
４５　輝度補正波形信号発生回路
４６　色むら補正波形信号発生回路
５１　Ａ／Ｄ変換回路
５２　ビデオ信号処理回路
５３　Ｄ／Ａ変換回路
６１　カラーＣＲＴ

６２　Ｒ，Ｇ，Ｂ出力回路

【図１】



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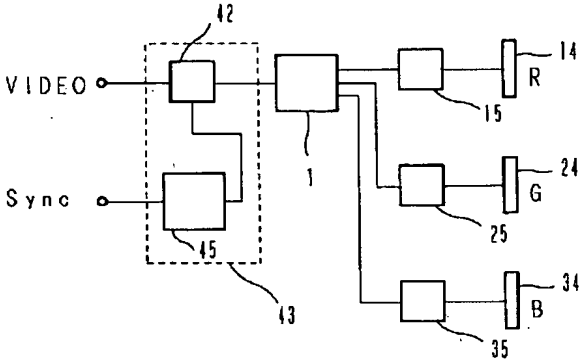

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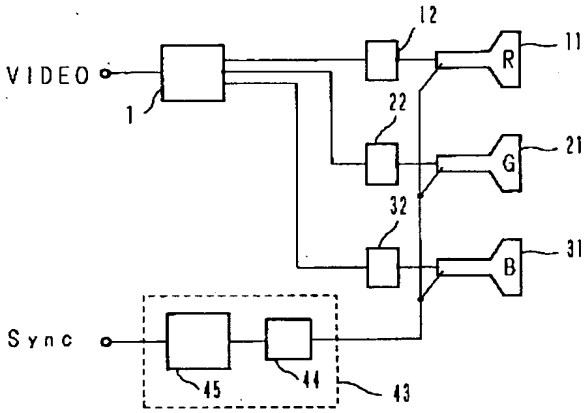

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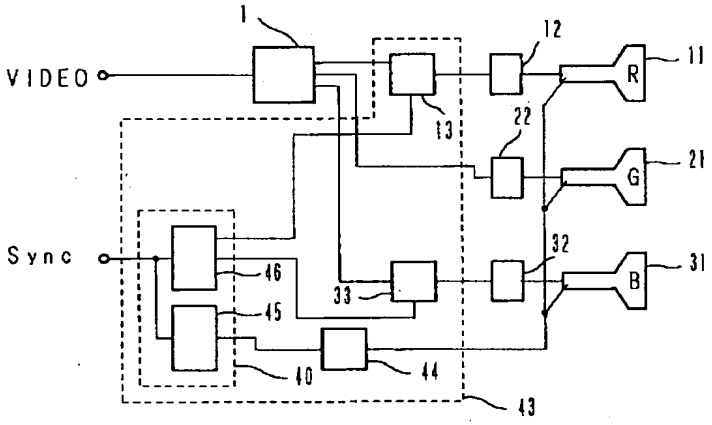

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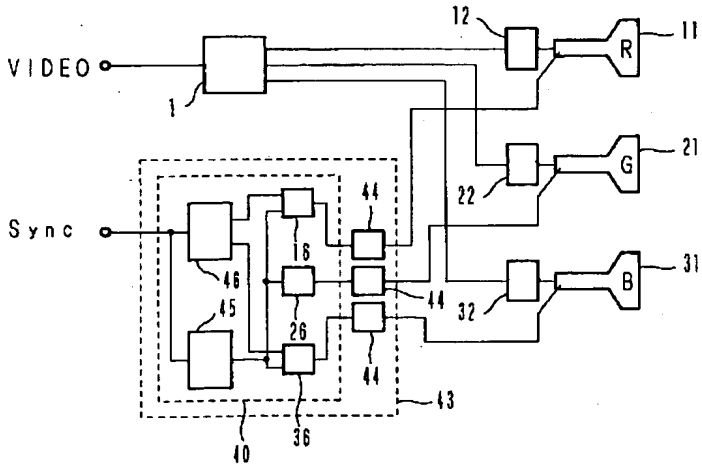

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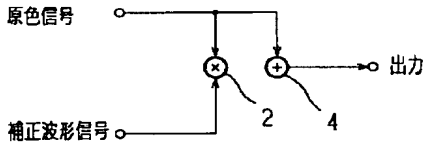

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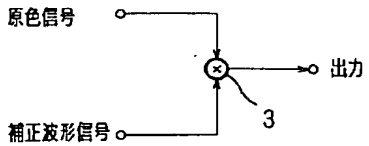

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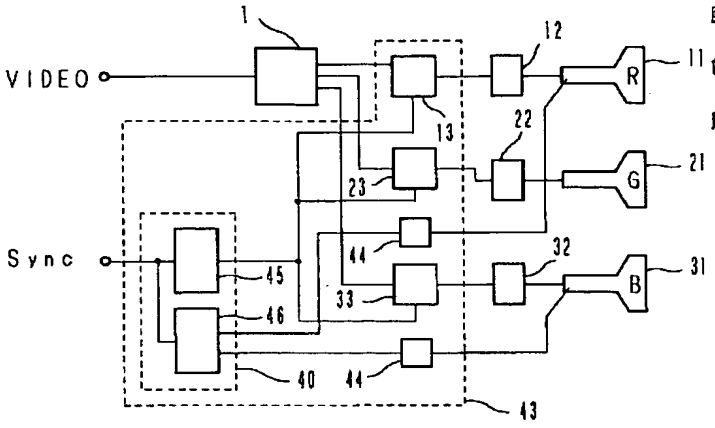

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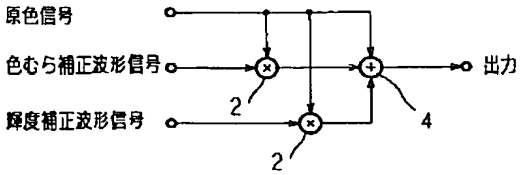

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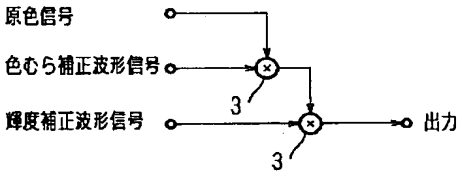

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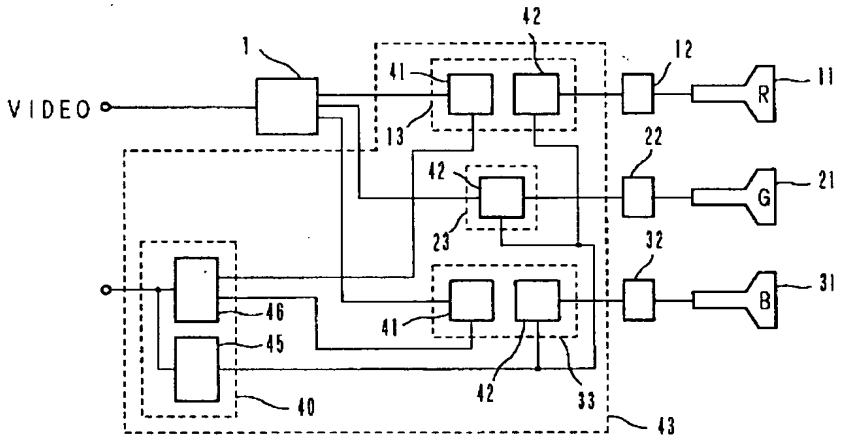

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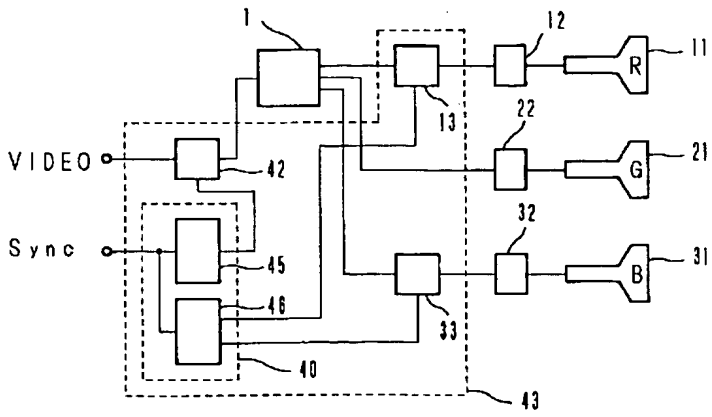

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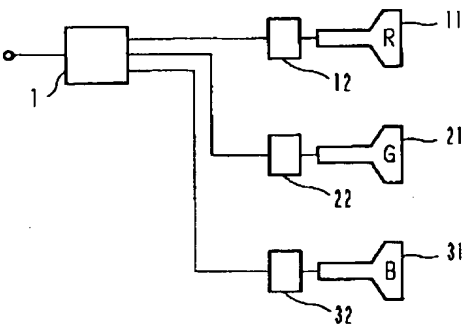

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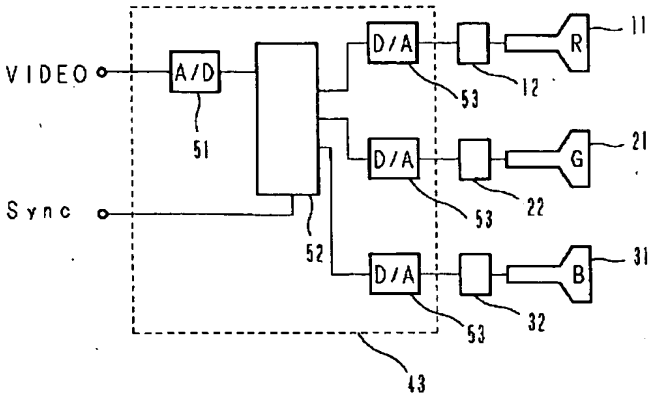

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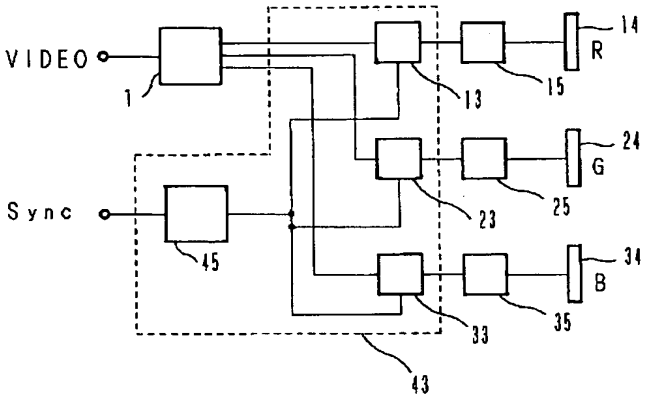
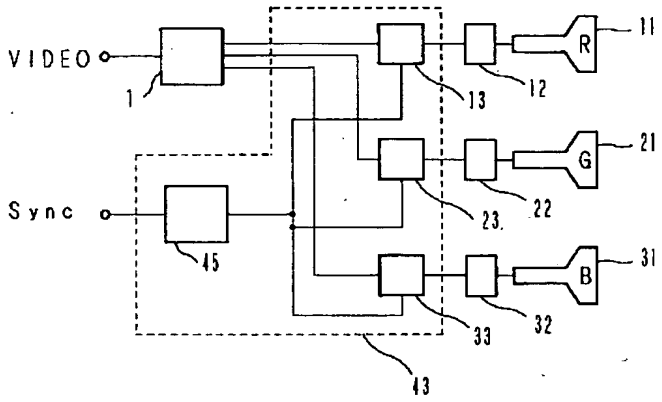


【図１０】



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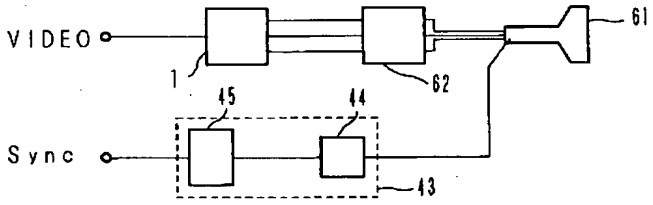
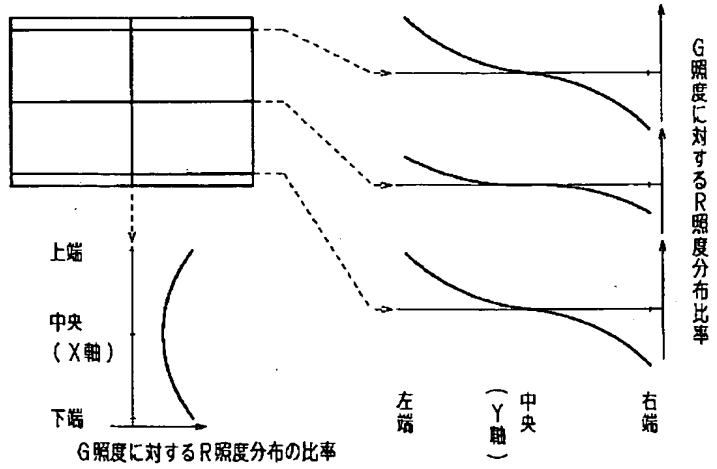
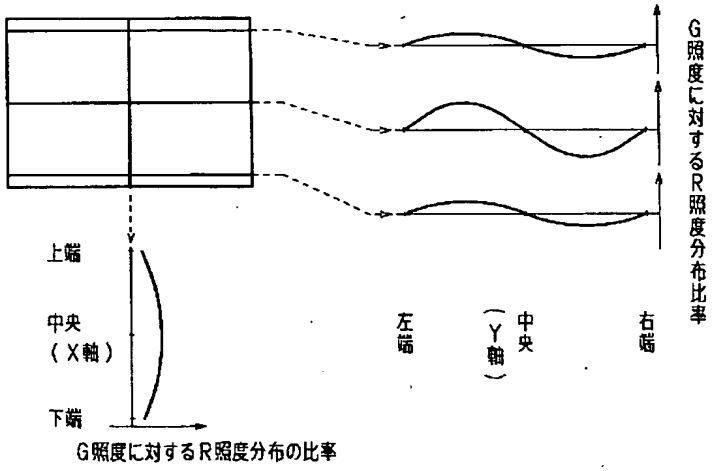


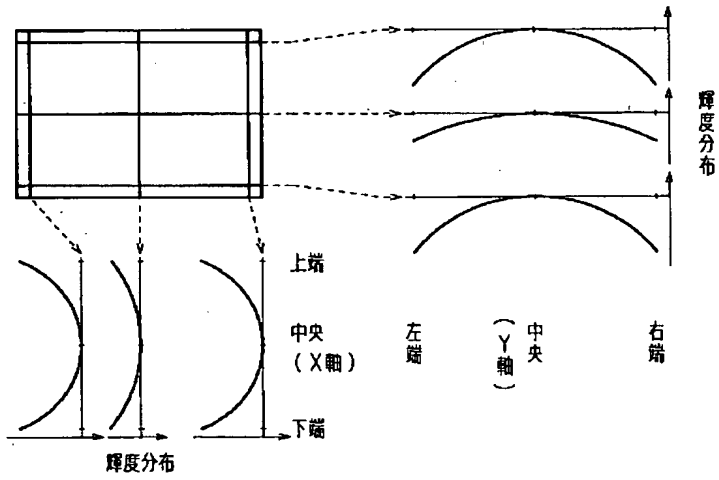
【図１８】



【図１９】



【図２０】



【手続補正書】
【提出日】平成４年８月５日
【手続補正１】
【補正対象書類名】明細書
【補正対象項目名】００１６
【補正方法】変更
【補正内容】
【００１６】次に、動作について説明する。なお、ここではビデオプロジェクターの光学系に色むら軽減光学系が用いられて、スクリーン上におけるＲの照度分布が図１９に示すようになっているとする。（Ｂの照度分布はＲの分布のＹ軸対称になる）この時、スクリーン上の輝度分布は図２０に示すようになる。ビデオマトリクス回路１では、入力ビデオ信号（コンポジット、Ｙ／Ｃ入力のどちらでもよい）がＲ，Ｇ，Ｂの原色信号に復調される。また、ビデオ回路にビデオ信号が入力されれば同時に同期信号（Ｓｙｎｃ信号）も入力される。輝度補正波形信号発生回路４５は上記同期信号に同期した水平輝度補正波形信号（水平パラボラ信号）と垂直輝度補正波形信号（垂直パラボラ信号）を作成し、同回路内で掛け合わせることで輝度補正波形信号が作られる。また、色むら補正波形信号発生回路４６では水平色むら補正波形信号（水平３次波形）と垂直色むら補正波形信号（垂直パラボラ信号）を作成し、これらを掛け合わせてＲ，Ｂ用の色むら補正波形信号が作られる。なお、補正波形信号の発生方法はコンバーゼンス補正波形発生用ＩＣを用いている。

【手続補正２】
【補正対象書類名】明細書
【補正対象項目名】００５８
【補正方法】変更
【補正内容】
【００５８】なお、これらのプロジェクターおけるユニフォミティ回路の構成は、液晶方式プロジェクターでは図８、９に示したＲ，Ｇ，Ｂの液晶パネル１４、２４、３４を１枚のカラー液晶パネルに置き換えるだけでよい。一方、ＣＲＴ方式プロジェクターでは図１０、１１において、Ｒ，Ｇ，ＢのＣＲＴ１１、２１、３１を１本のカラーＣＲＴに置き換えればよい。

PATENT ABSTRACTS OF JAPAN

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(43)Date of publication of application : 07.12.1993

(51)Int.Cl. G09G 1/28
G09G 1/00
G09G 5/02
H04N 9/31

(21)Application number : 04-134914

(22)Date of filing : 27.05.1992

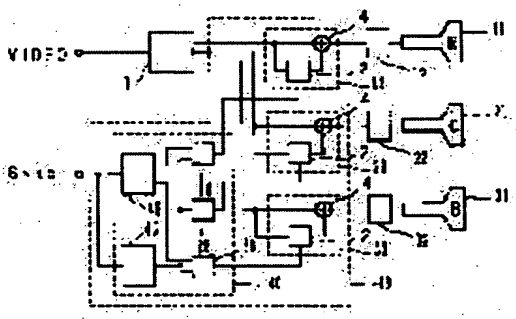
(71)Applicant : MITSUBISHI ELECTRIC CORP

(72)Inventor : ICHIMATSU AKIRA

(54) UNIFORMITY CIRCUIT

(57)Abstract:

PURPOSE: To improve the uniformity of a video projector by correcting residual color irregularities of R and B and correcting the brightness of the peripheral part of a screen.



CONSTITUTION: Color irregularity correction waveform signals (H: 3rd waveform, V: 2nd waveform) for a horizontal and a vertical synchronizing signal synchronized with main deflection and brightness correction waveform signals (H and V: 2nd waveform) are generated from the horizonta1 and vertical synchronizing signals, and correction waveform signals (R and B: correction of both color irregularity and brightness, G: correction of only brightness) for R, G, and B are generated from those correction waveform signals. Then R, G, and B primary-color signals are modulated with the correction waveform signals for R, G, and B respectively. The primary-color signals modulated with the correction waveform signals are amplified by CRT driving circuits 12, 22, and 32 and projected on CRT fluorescent screens, and their images are enlarged and projected on a screen through projection lenses installed in front of CRTs 11, 21, and 31. The image projected on the screen is reduced in color irregularity and improve in the brightness at the peripheral part of the screen since the color irregularity and brightness of the light output are already corrected.

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the uniformity circuit by the irregular color amendment and the brightness amendment circuit which are one of the image quality improvement circuits of the rear mold by the 3 lens CRT method, the 1 lens CRT method, 3 lens liquid crystal method, or 1 lens liquid crystal method, or a front mold video projector.
[0002]
[Description of the Prior Art] Irrespective of the rear mold and the front mold, the CRT method video projector carried out expansion projection of the monochrome image projected on monochrome small CRT of R, G, and B at the big screen screen with three projection lenses installed in the front face of a CRT phosphor screen, and has compounded and acquired the color image on the screen. For this reason, the quantity of light unevenness of R, G, and B occurs optically on a screen by the difference (difference in angles of convergence) of whenever [to the effect of optical-system each parts (two or more projection lenses which constitute one projection lens), and the set of CRT of R, G, and B / setting-angle], and the difference in the projection distance to the screen of each CRT. When the quantity of light unevenness of R, G, and B occurred and the White raster is copied on a screen, in a portion with much quantity of light of R, white becomes reddish, in a portion with much quantity of light of B, white becomes bluish at reverse, and white is no longer reproduced by homogeneity on a screen. The above-mentioned condition is called irregular color. **** [generating (condition that the irregular color remains about 10% on the screen) of an irregular color, about 10% / sense / the viewer of a projector / an irregular color]
[0003] He designs optical system and was trying for the yield (residual irregular color on a screen) of an irregular color to become small about the irregular color generated optically as mentioned above, so that an irregular color may decrease conventionally. However, only by layout of optical system, the amount of residual irregular colors was not made to zero, about the residual irregular color which still remains, it was left and the cure was not performed. The amount of maximum residual irregular colors at this time is about 10 - 15%. However, by having shortened optical projection distance (distance between projection lens screens) with thin-shape-izing of the depth of a rear mold video projector in recent years, even if it used irregular color reduction optical system, it became larger than the case where the amount of residual irregular colors on a screen uses the conventional optical system, and this (a residual irregular color occurs 15% to about 25%.) cure has been needed.
[0004] Drawing 18 is drawing having shown an example of the ratio of the illumination distribution of R which set to the video projector using the conventional optical system (with no cure against an irregular color), and was normalized to the illumination distribution of G on a screen. All over this drawing, the illumination distribution ratio of horizontal R is illustrating by making the point on a middle-of-the-screen axis of ordinate (Y-axis) into a reference point. If illumination distribution is horizontally observed at this time, the left end of a screen will become the most reddish and a right end will become the most bluish. Moreover, if illumination distribution is observed perpendicularly, in the upper limit

and the lower limit section of a screen, the amount of residual irregular colors will be observed most greatly. Since CRT of R and B is installed with angles of convergence alpha to CRT of G, this cause is because the optical distances from the projection lens of R and B to a screen left right end differ and projection distance differs at the right end of the screen left. Similarly, since CRT is installed with the elevation angle theta, vertical illumination distribution unevenness is because the projection distance to screen upper limit and a lower limit differs. In addition, since CRT of R and B is installed considering CRT of G as a symmetry axis, the illumination distribution on the screen of R and B becomes right-and-left reverse, and the illumination distribution of B falls most at the left end of a screen, and goes up most at the right end. In addition, since all three CRT is installed at the same angle (elevation angle), as for a perpendicular direction, it becomes the distribution with the same perpendicular illumination of R and B.

[0005] Moreover, drawing 19 is drawing having shown an example of the ratio of the illumination distribution of R normalized to the illumination distribution of G on the screen in the video projector using the optical system designed so that a residual irregular color might be reduced, and is shown on the basis of the point on a Y-axis like drawing 18 . Moreover, it becomes right-and-left reverse and distribution of B is distributed, as the Y-axis was made into symmetry for distribution of R as well as [conventionally] optical system. For this reason, although the left-hand side one half of a screen becomes reddish and right-hand side one half becomes bluish, most of the residual irregular color of screen right-and-left both ends is not admitted. Moreover, the amount of residual irregular colors becomes large, and becomes max on a middle-of-the-screen horizontal axis (X-axis), so that a screen center section will be approached, if it is perpendicular and observes. However, as the field angle at the right end of [screen left] the projection lens of R and B becomes equal, since [which shifted the shaft of a projection lens] it carried out [****] and optical system was used, this optical system becomes such. In addition, the peak of the residual irregular color by this optical system becomes smaller than the residual irregular color peak by optical system conventionally, and that amount of residuals becomes about 10%. (When the distance between projection lens screens is about 800mm with a 45" rear mold projector.) However, if set depth is thin-shape-ized further, the above-mentioned projection distance will be shortened further and the amount of residual irregular colors on a screen will become larger than the present.

[0006] Here, configuration block drawing of the conventional video circuit which does not include a uniformity circuit in drawing 17 is shown. In this drawing, the video matrix circuit which restores to the video signal into which 1 was inputted to R, G, and B primary signal, small CRT to which 11, 21, and 31 copy the image of R, G, and B, and 12, 22 and 32 are the output circuits for driving CRT 12, 21, and 31.

[0007] Next, actuation is described briefly. A video signal is inputted into a video circuit by the composite signal or the Y/C signal. It restores to the video signal inputted into the video circuit to the primary signal of R, G, and B by the matrix of the video matrix circuit 1. and R, G, and B -- each primary signal is sent to each output stage 12, 22, and 32 -- having -- R, G, and B -- each CRT 11, 21, and 31 is driven and the monochrome image (raster) of R, G, and B copies out on a CRT phosphor screen. With the projection lens (not shown) with which the optical output was installed in the front face of CRT, expansion projection of those monochrome images is carried out at a screen, and, as for the image copied on the CRT phosphor screen, a color image is acquired by performing composition of R, G, and B optically on a screen.

[0008] if the case where the White raster signal is now inputted into the video circuit of a projector is considered -- R, G, and B -- in the location of the arbitration of the raster on the phosphor screen of each CRT 11, 21, and 31 since electron beam current density becomes equal -- R, G, and B, although the brightness of the raster on each CRT phosphor screen becomes equal A projection lens is cos4. There is a property in which the brightness of a screen periphery which becomes large [a field angle] with a principle falls, the brightness of the image on a screen does not have this fixed owing to, and the brightness of a screen periphery falls. (Fall of the circumference and a pin center,large brightness ratio) In the conventional rear mold video projector, the circumference and a pin center,large brightness ratio

were about 20 - 30%. (When the total field angle of a projection lens is the conventional rear mold projector which is about 54 degrees.)
[0009]
[Problem(s) to be Solved by the Invention] It is further expanded with thin-shape-izing of the depth of a rear mold video projector owing to [field angle / of the projection lens of the projector of the former / field angle / of a projection lens] that the projection distance between a projection lens and a screen shortens. Consequently, the brightness of a screen periphery falls further rather than before, and the circumference and a pin center,large brightness ratio also fall further compared with the conventional video projector. For example, with the rear mold projector from which a total field angle becomes 80 degrees, as for the screen circumference brightness on a screen, only the circumference brightness of the abbreviation one half of the conventional projector whose total field angle is 54 degrees is obtained, and the circumference and the pin center,large brightness ratio of a set fall till around 10%. When the brightness of a periphery fell to this level, the viewer of a projector had the trouble that the brightness unevenness of not only a residual irregular color but a screen periphery or middle of the screen was worrisome to the hot spot which shines brightly.
[0010] It was made in order that this invention might cancel the above troubles, and while aiming at reduction of the amount of residual irregular colors generated by shortening of the projection distance between the projection lens accompanying thin-shape-izing of the depth of a rear mold video projector, and a screen, expansion of the field angle of a projection lens improves the circumference and the pin center,large brightness ratio fall generated owing to, and improves uniformity. Moreover, it aims at obtaining the uniformity circuit which can amend the brightness fall of the residual irregular color on the screen left until now, and a screen periphery by using for the conventional video projector (both rear mold and front mold).
[0011]
[Means for Solving the Problem] A uniformity circuit concerning this invention is performed by modulating R, G, and B primary color video signal by irregular color amendment wave signal, brightness amendment wave signal, or both synthetic amendment wave signal, controlling a beam current which flows to CRT of R, G, and B, controlling a brightness output on a CRT phosphor screen, and uniform illumination distribution of R, G, and B being acquired on a screen.
[0012] or a thing for which a signal given to G1 of CRT of R, G, and B is modulated by irregular color amendment wave signal, brightness amendment wave signal, or both synthetic amendment wave signal -- R, G, and B -- it carries out by controlling a beam current which flows to each CRT, controlling a brightness output on a CRT phosphor screen, and uniform illumination distribution of R, G, and B being acquired on a screen.
[0013] Or it carries out by controlling a beam current which flows to CRT of R, G, and B by combining two above-mentioned methods suitably, controlling a brightness output on a CRT phosphor screen, and uniform illumination distribution of R, G, and B being acquired on a screen.
[0014]
[Function] Since the irregular color and brightness amendment wave signal in this invention are created like convergence amendment by the product of level, the level which synchronizes with a perpendicular main deviation, and the amendment wave signal of a perpendicular period, the dynamic irregular color and brightness amendment according to a screen location can perform them.
[0015]
[Example]
One example of this invention is explained about drawing below example 1. The video matrix circuit where 1 restores to an input video signal to R, G, and B primary signal in drawing 1 , The modulation circuit for 2 modulating a video signal by the amendment wave signal, and creating an amendment signal, The adder circuit where 4 performs addition of an amendment signal and a primary signal, CRT of R, G, and B to which 11, 21, and 31 copy an image, 12, 22, and 32 The drive circuit of CRT 12, 22, and 32 of R, G, and B, R and G which 13, 23, and 33 become from a modulation circuit 2 and an adder circuit 4, the amendment circuit which performs amendment of B primary signal, The brightness

amendment wave signal generating circuit to which 16, 26, and 36 create the amendment wave signal creation circuit of R, G, and B, and 45 creates the brightness amendment wave signal of R, G, and B, The irregular color amendment wave signal generating circuit to which 46 creates the irregular color amendment wave signal of R and B, 40 is the irregular color and brightness amendment wave signal generating circuit which are constituted by the brightness amendment wave signal generating circuit 45, the irregular color amendment wave signal generating circuit 46, and the amendment wave signal generating circuits 16, 26, and 36 of R, G, and B. Moreover, 43 is a uniformity circuit which consists of amendment circuits 13, 23, and 33 of R, G, and B, and an irregular color and the brightness amendment wave signal generating circuit 40.

[0016] Next, actuation is explained. In addition, irregular color mitigation optical system is used for the optical system of a video projector here, and the illumination distribution of R on a screen presupposes that it is shown in drawing 15 . (The illumination distribution of B becomes Y axial symmetry of distribution of R) At this time, the luminance distribution on a screen comes to be shown in drawing 20 . In the video matrix circuit 1, an input video signal (either a composite or a Y/C input may be used) gets over to the primary signal of R, G, and B. Moreover, if a video signal is inputted into a video circuit, a synchronizing signal (Sync signal) will also be inputted into coincidence. The brightness amendment wave signal generating circuit 45 creates the level brightness amendment wave signal (level parabola signal) and perpendicular brightness amendment wave signal (perpendicular parabola signal) which synchronized with the above-mentioned synchronizing signal, and a brightness amendment wave signal is made from multiplying in this circuit. Moreover, a level irregular color amendment wave signal (3rd horizontal wave) and a perpendicular irregular color amendment wave signal (perpendicular parabola signal) are created, these are multiplied, and the irregular color amendment wave signal for R and B is made from the irregular color amendment wave signal generating circuit 46. In addition, the generating method of an amendment wave signal uses IC for convergence amendment wave generating.

[0017] In addition, it is necessary to compound the amendment wave signal of both irregular color amendment and brightness amendment, and to make the amendment wave signal of R and B about R and B. When it thinks that a video primary signal will be modulated for both amendments in order, and the amendment will be performed if the video primary signal of R or B before performing amendment X for irregular color amendment and performing Amendment Y and amendment for brightness amendment now is set to A, the primary signal B after amendment is expressed with the formula 1 shown below.

B=(1+X) -(1+Y) A ..... Formula 1 (=A+(X+Y+XY) A) ..... Formula 1' [0018] When it thinks that an irregular color amendment signal and a brightness amendment signal are compounded, and it amends in one (a synthetic amendment signal is set to Z) modulation on the other hand, the primary signal C after amendment is expressed with the formula 2 shown below.

C=ZA ..... Formula 2 [0019] Since B and C which are obtained after amendment here must be the same, a formula 1 and a formula 2 must become equal and the formula 3 which for that is shown below needs to be materialized.

Z=(1+X)(1+Y)

= 1+X+Y+XY ..... Formula 3 [0020] Therefore, it turns out that it is obtained by adding the product signal (XY) of an irregular color amendment wave signal (X) and a brightness amendment wave signal (Y), and the sum (X+Y) of both the amendment wave as the amendment wave signal of R and B shown in a formula 3. in addition, the signal after the HARASHIN number which is not becoming irregular amending the constant 1 in the right-hand side of a formula 3 -- existing (it thinking like formula 1'.) -- it will think and will not treat by the amendment wave signal.

[0021] The amendment wave signal of R and B is acquired by adding the sum signal of an irregular color amendment wave signal, the product signal of a brightness amendment wave signal, and both the amendment wave signal in the amendment wave signal creation circuits 16 and 36. As for G, a brightness amendment wave signal is sent to G amendment wave signal creation circuit 26 as it is. The amendment wave signal of R, G, and B which were created as mentioned above is sent to the amendment circuits 13, 23, and 33 of R, G, and B, respectively.

[0022] The configuration of the amendment circuits 13, 23, and 33 of R, G, and B is completely the

same, and shows this configuration to drawing 13 . In this drawing, the multiplication circuit for 2 multiplying an amendment wave signal and a primary signal, and creating an amendment signal and 4 are adder circuits which perform addition of a primary signal and an amendment signal. Next, explanation of operation is performed. The primary signal after amendment adds an irregular color, and the thing and primary signal which modulated the primary signal by the wave (X+Y+XY) which added the product of brightness both the amendment wave, and the sum of both the amendment wave, as the formula 3 showed. In the multiplication circuit 2, a brightness amendment signal is created for a primary signal and a brightness amendment wave signal (X+Y+XY) by multiplication. Next, the primary signal with which amendment was made by the above-mentioned amendment signal and a primary signal being added in an adder circuit 4 is acquired. In addition, although a brightness amendment wave signal turns into an amendment wave signal of G since there is no irregular color amendment signal in G, actuation is the same as R and B. (The modulation method of this primary signal is hereafter called a modulation technique 1.) At a modulation technique 1, since many primary signals to an output primary signal are included, there are few damages to S/N.

[0023] In addition, adjustment of the amendment level of irregular color amendment and brightness amendment can be performed by controlling the amplitude of an irregular color amendment wave signal and a brightness amendment wave signal to the synthetic amendment wave signal creation time of R and B, respectively.

[0024] It is made above. R, G, and the primary signal with which an irregular color and brightness amendment were B each performed It is sent to output circuits 12, 22, and 32, it is amplified here, and CRT 11, 21, and 31 of R, G, and B drives. The image to which an irregular color and brightness amendment were carried out projects on CRT 11 and 21 and 31, it is projected on a screen with a projection lens, and an irregular color is reduced and the image on a screen turns into an image with which the uniformity by which the brightness of a screen periphery was moreover also amended has been improved.

[0025] Although the primary signal which amended in the amendment circuits 13, 23, and 33 by the thing adding an amendment signal and a primary signal which is example 2. has been acquired in the above-mentioned example, the circuit which acquires the primary signal (1+X+Y+XY) which amended only in the modulation circuit without using the adder circuit which performs addition of a primary signal and an amendment signal can be constituted, and such an example is described here. The configuration of the amendment circuits 13, 23, and 33 in this example is shown in drawing 14 . The configuration of other uniformity circuits turns into circuitry stated in the example 1. In drawing 14 , 3 is a multiplication circuit which multiplies an amendment wave signal and a primary signal and modulates a primary signal. The amendment wave signal which the amendment signal used here was equivalent to right-hand-side 1+X+Y+XY of a formula 3, and was shown in the example 1 (X+Y+XY), The differences in the amendment wave signal of this example are whether the primary signal which amended is acquired only by the modulation, and that difference which is not obtained, and as DC level (is there any constant 1 or is there nothing?) only differed by the amendment wave signal and shown also in a formula, AC component of an amendment wave signal is the same. Moreover, level adjustment of each amendment can be performed by controlling the amplitude of AC component of an amendment wave signal.

[0026] In the amendment circuits 13, 23, and 33 shown in this example, since an adder circuit becomes unnecessary in an amendment circuit, compared with the uniformity circuit (modulation technique 1) shown in the example 1, there is an advantage that the scale of a uniformity circuit becomes small. (The modulation method of this primary signal is hereafter called modulation technique 2)

[0027] Although the amendment wave which compounds the irregular color of R and B and a brightness amendment wave signal, and can perform both amendments was constituted in order that the amendment circuits 13, 23, and 33 of R, G, and B shown in the example 3. examples 1 and 2 might make the scale of an amendment circuit small In this case, in order the amendment wave signal creation circuits 16 and 36 are needed in the amendment wave signal of R and B and to create the amendment wave signal of R and B here, the amendment wave signal generating circuit 40 will become large.

Therefore, without making the synthetic amendment wave of R and B from the amendment wave signal generating circuit 40 side, an irregular color amendment signal and a brightness amendment signal may be created in the amendment circuits 13 and 33, and a circuit may be constituted so that these may be added with a primary signal. Thus, constituted configuration block drawing of the amendment circuit of R and B is shown in drawing 15 . Moreover, as for the amendment wave signal generating circuit 40, the amendment wave signal creation circuits 16, 26, and 36 of R, G, and B become unnecessary. In addition, since amendment of G is only brightness amendment, the amendment circuit shown in examples 1 and 2 will be used. (The modulation method of this R and B primary signal is hereafter called modulation technique 3) In addition, level adjustment of each amendment is performed by controlling the amplitude of each amendment wave signal.

[0028] The amendment circuits 13 and 33 of R and B shown in the example 4. example 3 may constitute an amendment circuit, without using an adder circuit, as the irregular color amendment signal and brightness amendment signal which were created by the irregular color and brightness both the amendment wave signal, and a primary signal are shown in an example 2, although added here using the adder circuit 4. Thus, the example of the constituted amendment circuit is shown in drawing 16 . In addition, since amendment of G is only brightness amendment, the amendment circuit shown in examples 1 and 2 will be used. Moreover, although it is becoming irregular in order of irregular color amendment and brightness amendment about the primary signal of R and B in drawing 16 , the sequence of this modulation may be reverse. (The modulation method of this R and B primary signal is hereafter called a modulation technique 4.) However, it is more advantageous on circuitry to become irregular rather than the amount of irregular color amendments, in the procedure shown in drawing 16 , since the way of the amount of brightness amendments has the large amount of amendments. In addition, level adjustment of each amendment is performed by controlling the amplitude of each amendment wave signal.

[0029] As mentioned above, as stated, the amendment circuit of R and B has four kinds of methods of modulation techniques 1-4, and the amendment circuit of G has two kinds of methods of modulation techniques 1 and 2. Therefore, although the demerit that a circuit scale becomes large arises, the modulation technique by the amendment wave signal of R, G, and B primary signal may be chosen freely out of the above-mentioned modulation technique, may be combined, and may constitute a uniformity circuit.

[0030] In addition, even if it constitutes the amendment circuits 13, 23, and 33 of R, G, and B from each modulation technique described above, all the adjustment methods of amendment level can be performed by controlling the amplitude of each amendment wave signal.

[0031] In example 5. above-mentioned each example, although irregular color amendment and brightness amendment were explained about the case where modulating R, G, and B primary signal amends, as they are shown in drawing 2 , irregular color amendment may modulate R and B primary signal, and giving a brightness amendment wave to CRT 11 and 21 of R, G, and B and 31G1 may perform brightness amendment. In drawing 2 , the amendment wave signal generating circuit which 40 becomes from the brightness amendment wave signal generating circuit 45 and the irregular color amendment wave signal generating circuit 46, and 44 are G1 drive circuits for giving a brightness amendment wave signal to three CRT 11 and 21 and 31G1. Moreover, 43 is a uniformity circuit which consists of the amendment circuits 13 and 33 of R and B, an amendment wave signal generating circuit 40, and a G1 drive circuit 44. In addition, if a circuit is constituted in this way, the amendment circuit 23 of G which modulates the primary signal of G will become unnecessary.

[0032] Moreover, the circuitry of R at this time and the amendment circuits 13 and 33 of B has two kinds of the modulation techniques 1 and 2 shown in examples 1 and 2, among these may use which modulation technique. In addition, as for the amendment wave signal at this time, R and B become only an irregular color amendment wave signal, and adjustment of amendment level is performed by controlling the amplitude of each irregular color amendment wave signal.

[0033] On the other hand, CRT 11 and 21 of R, G, and B and the brightness amendment wave (level parabola wave x perpendicular parabola wave) given to 31G1 are created in an irregular color and the

brightness amendment wave generating circuit 40, is amplified to voltage required to drive G1 in G1 drive circuit 44, and is given to three CRT 11 and 21 and 31G1. The amount of electron beams by which outgoing radiation is carried out from an electron gun in G1 voltage of CRT being modulated by the brightness amendment wave signal is modulated by the brightness amendment wave signal, the amount of electron beams of the portion to which the brightness of a screen periphery falls increases, and, as for the raster copied on a CRT phosphor screen, the raster by which brightness amendment was made is obtained. Moreover, adjustment of brightness amendment level is performed by controlling the amplitude of a brightness amendment wave signal by the creation stage of the brightness correction voltage given to G1.

[0034] Without irregular color amendment and brightness amendment carrying out mutually-independent, and moreover interfering mutually with constituting the uniformity circuit 43 as mentioned above, optimal irregular color amendment and brightness amendment can be performed, and an improvement of uniformity is made.

[0035] The example shown in example 6. drawing 3 modulates the beam current by giving both the amendment wave signal of irregular color amendment and brightness amendment to CRT 11 and 21 of R, G, and B, and 31G1, and are an irregular color and the uniformity circuit constituted so that brightness amendment might be performed. the generating circuit of the amendment wave signal with which 40 consists of the brightness amendment wave signal generating circuit 45, an irregular color amendment wave signal generating circuit 46, and amendment wave signal creation circuits 16, 26, and 36 of R, G, and B in drawing 3 , and 44 -- R, G, and B -- each CRT 11 and 21, G1 drive circuit which performs the drive of 31 ofG1, and 43 are uniformity circuits which consist of the above-mentioned amendment wave signal generating circuit 40 and the above-mentioned G1 drive circuit If a uniformity circuit is constituted as mentioned above, the video circuit which uses R, G, and B primary signal with the conventional video projector by the amendment circuits 13, 23, and 33 which become irregular by the amendment wave signal of each color becoming unnecessary can be used as it is.

[0036] Three CRT 11 and 21 used here and the amendment wave signal given to 31G1 are the same as the wave stated in the example 1, and the amplitude level of an amendment signal only differs. An irregular color amendment wave signal The product of a 3rd horizontal wave signal and a secondary perpendicular (parabola) wave signal, A brightness amendment wave signal is the product of a secondary horizontal (parabola) wave signal and a secondary perpendicular (parabola) wave signal. As for G, a brightness amendment wave signal turns into [an irregular color and the synthetic amendment wave signal of both the amendment wave of brightness amendment] an amendment wave signal, the above-mentioned amendment wave signal is amplified in G1 drive circuit 44, R and B are given to each CRT 11 and 21 and 31G1, and each amendment is made.

[0037] In addition, adjustment of the amount of irregular color amendments and the amount of brightness amendments can be performed by controlling the amplitude of an irregular color amendment wave signal and a brightness amendment wave signal, respectively.

[0038] In the example shown in example 7. drawing 4 , brightness amendment is performed in modulating R, G, and B primary signal by the brightness amendment wave signal, and irregular color amendments of R and B are CRT11 of R and B, and the uniformity circuit constituted so that giving an irregular color amendment wave signal to 31G1 might amend. In drawing 4 , the amendment wave signal generating circuit which 40 becomes from the brightness amendment wave signal generating circuit 45 and the irregular color amendment wave signal generating circuit 46, and 43 are uniformity circuits which consist of amendment circuits 13, 23, and 33 which modulate the amendment wave signal generating circuit 40, G1 drive circuit 44 of CRT 11 and 31 of R and B and R and G, and B primary signal by the brightness amendment wave signal.

[0039] Which method may be used although the modulation technique of a brightness amendment wave signal has two kinds of the modulation techniques 1 and 2 stated in the examples 1 and 2. Moreover, adjustment of amendment level is controlling the amplitude of a brightness amendment wave signal, and the amplitude of the irregular color amendment wave signal of R and B, and can be adjusted independently, respectively.

[0040] It is the uniformity circuit constituted from an example shown in example 8. drawing 5 so that it might amend by modulating R, G, and B primary signal to according to by the irregular color and the brightness amendment wave signal, respectively. In drawing 5 , the amendment wave signal generating circuit which 40 becomes from the brightness amendment wave signal generating circuit 45 and the irregular color amendment wave signal generating circuit 46, and 43 are uniformity circuits which consist of the amendment wave signal generating circuit 40, amendment circuits 13 and 33 of R and B, and an amendment circuit 23 of G. In addition, the amendment circuits 13 and 33 of R and B consist of an irregular color amendment circuit 41 and a brightness amendment circuit 42 (the installation sequence of an amendment circuit may be except being shown in drawing 5 .), and the amendment circuit 23 of G consists of brightness amendment circuits 42. At this time, although the irregular color amendment circuit 41 and the brightness amendment circuit 42 have two kinds of modulation techniques 1 and 2, they may be which method.

[0041] In addition, if a uniformity circuit is constituted as shown in this example, it is necessary to prepare the modulation circuit of a total of five CH(s) by R, G, and B but, and since these 5CH(s) can be considered as the completely same configuration, all of the adjustment method of amendment level or the circuit adjustment method become the same, and a coordinator can be adjusted easily. In addition, adjustment of an irregular color and brightness amendment level is performed by controlling the amplitude of the irregular color inputted into each modulation circuit of 5CH(s), or a brightness amendment wave signal.

[0042] In the example shown in example 9. drawing 6 , the luminance signal of the video signal (either a composite or a Y/C input may be used) before inputting into the video matrix circuit 1 in becoming irregular by the brightness amendment wave signal It is the uniformity circuit constituted so that an irregular color and brightness amendment might be performed in performing brightness amendment processing before getting over to R, G, and B primary signal, then getting over to R, G, and B primary signal in the video matrix circuit 1, and becoming irregular by the irregular color amendment wave signal about R and B primary signal. Since brightness amendment will already be completed when it gets over to R, G, and B primary signal if constituted as mentioned above and G primary signal can be led to an output stage 22 as it is, the amendment circuit 13 of G becomes unnecessary. In addition, in drawing 6 , 45 is a brightness amendment wave signal generating circuit, 46 is an irregular color amendment wave signal generating circuit, and 40 consists of a brightness amendment wave signal generating circuit 45 and an irregular color amendment wave signal generating circuit 46. Moreover, the brightness amendment circuit which modulates the video signal before restoring to 42 to R, G, and B primary signal by the brightness amendment wave signal, and 43 are uniformity circuits which consist the amendment wave signal generating circuit 40, a brightness amendment circuit 42, and amendment circuits 13 and 33 of R and B.

[0043] If a uniformity circuit is constituted as mentioned above, a Y signal will be modulated after carrying out Y/C separation of the composite signal, when a video signal is inputted with a composite signal. On the other hand, since it is modulation ****** as it is, the modulation circuit for brightness amendment can be managed with 1 set and a Y signal is ended with 3 sets of modulation circuits for amendment on the whole together with the modulation circuits 13 and 33 for irregular color amendment of R and B when inputted by the Y/C signal, contraction-ization of the circuit scale of a uniformity circuit can be performed. Moreover, an irregular color and the adjustment method of brightness amendment level are performed by controlling the amplitude of an irregular color and a brightness amendment wave signal like each above-mentioned example.

[0044] Moreover, although the method of modulating R and B primary signal for irregular color amendment of R and B is used in the example shown in drawing 6 , irregular color amendment of R and B can also be amended by giving an irregular color amendment wave signal to G1 of CRT of R and B. In this case, the amendment circuits 13 and 33 of R and B become unnecessary, and it becomes a configuration as shown in the example 6. The uniformity circuit 43 consists of an amendment wave generating circuit 40, a brightness amendment circuit 42, and a G1 drive circuit 44 of R and B, and the same effect as the above-mentioned example is acquired. Moreover, the adjustment method of

amendment level is the same as each above-mentioned example.
[0045] Digital conversion of the analog video signal which has not got over in the example shown in example 10. drawing 7 before inputting into the video matrix circuit 1 is carried out in the A/D-conversion circuit 51. Digital one R which performed recovery to R, G, and B primary signal, and an irregular color and brightness amendment processing for the digital video signal by the digital operation, and performed an irregular color and brightness amendment, G, and B primary signal by the D/A conversion circuit 53 It is the uniformity circuit constituted so that an irregular color and brightness amendment might be performed by changing into an analog primary signal again. Moreover, full digitization of a video circuit can be performed by enabling it to also process various image quality adjustments, such as bright one and contrast, by the operation in the software of the digital-signal-processing circuit 52. In drawing 7 , the A/D-conversion circuit where 51 changes an input analog video signal into a digital video signal, the video signal processing circuit where 52 performs R, G, B recovery and an irregular color, a brightness amendment operation, and various image quality adjustment operations, and 53 are D/A conversion circuits which change R, G, and B digital primary signal into an analog primary signal, and are 51, 52, and 53, and the uniformity circuit 43 is constituted.
[0046] although the circuit scale of a video circuit becomes large about an irregular color and brightness amendment in this example in order to modulate a video signal by digital data processing -- R, G, and B -- it not only can perform an irregular color and brightness amendment by amendment wave different, respectively, but also in the same color, to dispersion in the illumination distribution of R, G, and B of an one-set mass-production set different one set, it can perform the one-set optimal one set amendment in each color, and it can improve In addition, level adjustment of an irregular color and brightness amendment can be performed by carrying out adjustable [of the correction factor] at the time of a digital operation.
[0047] Although each above-mentioned examples 1-10 described so far more than example 11. have been described as a uniformity circuit in a rear mold 3 lens method CRT method video projector, they can also be used for a front mold 3 lens method CRT method video projector. A residual irregular color occurs on a screen under the effect of a projection lens with a front mold 3 lens method CRT method video projector as well as a rear mold 3 lens method video projector, and a brightness fall takes place compared with pin center,large brightness in a screen periphery. Therefore, reduction of a residual irregular color and the improvement of a circumference brightness fall can be attained by using a uniformity circuit, and improvement in uniformity can be attained. Moreover, the adjustment method of amendment level is the same as each above-mentioned example which is a rear mold projector.
[0048] If the examples 1-4 which perform irregular color amendment and brightness amendment by the modulation of R, G, and B primary signal, and the uniformity circuit which showed 8-10 are used among example 12. above-mentioned each example In 3 lens method liquid crystal video projector using a liquid crystal panel The brightness fall of the residual irregular color generated on a screen under the effect of a projection lens and a screen periphery can be improved, and improvement in the uniformity of the image projected on the screen with both 3 lens method liquid crystal rear mold and 3 lens method liquid crystal front mold projector can be attained. In addition, the configuration of the uniformity circuit 43 transposes drawing 1 and CRT 11, 21, and 31 of R, G, and B which were shown in 5, 6, and 7 to the liquid crystal panels 14, 24, and 34 of R, G, and B, output circuits 12, 22, and 32 are only transposed to the liquid crystal panel drive circuits 15, 25, and 35, respectively, and other configurations are good with a configuration of having been shown in each drawing having shown the above-mentioned example.
[0049] Example 13. drawing 8 is the block diagram of the example of a uniformity circuit including the video circuit in 1 lens method liquid crystal projector by this invention, and is set to this drawing. R, G, and B with which 14, 24, and 34 build the image of R, G, and B -- each liquid crystal panel -- 15, 25, 35R, and G and B -- it is the circuit which is equivalent to the output circuits 12, 22, and 32 of R, G, and B with a CRT method projector in the drive circuit of each liquid crystal panel 14, 24, and 34, and 45 is a brightness amendment wave signal generating circuit. Moreover, the uniformity circuit 43 is constituted by the brightness amendment wave signal generating circuit 45 and the amendment circuits 13, 23, and 33.

[0050] With 1 lens method projector, it compounds, before projecting the monochrome raster of R, G, and B, and a color image is acquired, and expansion projection of the color image is carried out behind at the screen. Therefore, since the light source (liquid crystal panel) of R, G, and B is installed on the same conditions to a screen, the illuminance unevenness on the screen of R and B to the illuminance of G under the effect of angles of convergence is not generated theoretically. Therefore, an irregular color is not generated. On the other hand, the brightness of the image of a screen periphery falls for the effect of the field angle of a projection lens. Therefore, regardless of a CRT method and a liquid crystal method, regardless of a rear mold and a front mold projector, an irregular color amendment circuit becomes unnecessary and only brightness amendment is needed with 1 lens method projector. For this reason, the uniformity circuit of this invention consists of only brightness amendment circuits.
[0051] As mentioned above, the uniformity circuit of the example shown in drawing 8 performs the modulation of R, G, and B primary signal by the output amendment signal of the brightness amendment wave signal generating circuit 45, and is copying the image with liquid crystal panels 14, 24, and 34. Although the configuration of the modulation circuits 13, 23, and 33 of R, G, and B has two kinds of the above-mentioned modulation techniques 1 and 2, which modulation technique may be used. Moreover, level adjustment of brightness amendment is performed by controlling the amplitude of a brightness amendment wave signal. The above result, the brightness of a screen periphery is amended, a hot spot etc. is lost in the photograph center section, and the image quality improvement of a projector is attained.
[0052] Moreover, in the example of this invention shown in drawing 8 , the block diagram showing the configuration of a video circuit including the uniformity circuit of the example of this invention which transposed the liquid crystal panels 14, 24, and 34 of R, G, and B to CRT 11, 21, and 31 of R, G, and B, and transposed the liquid crystal panel drive circuits 15, 25, and 35 to the output circuits 12, 22, and 32 for CRT, and was used for the 1 lens method CRT projector is drawing 10 . About actuation, R, G, and B primary signal are modulated by the brightness amendment wave signal like the above-mentioned 1 lens method liquid crystal projector. The adjustment method can be performed like each above-mentioned example, can improve the brightness fall of the screen periphery of the image projected on the screen like the above-mentioned 1 lens method liquid crystal projector, and can acquire the same effect as 1 lens method liquid crystal projector.
[0053] Example 14. drawing 9 is the block diagram of other examples of a uniformity circuit including the video circuit in 1 lens method liquid crystal projector by this invention, and the uniformity circuit 43 consists of a brightness amendment wave signal generating circuit 45 and a brightness amendment circuit 42 which performs the modulation of a video signal (Y signal) in this drawing. In addition, this example applies the uniformity circuit stated in the example 9 to 1 lens method projector. The video signal before inputting into the video matrix circuit 1 in the uniformity circuit shown in this example (either a composite or a Y/C input may be used.) In the composite signal, Y/C separation is performed, before performing brightness amendment. Before getting over to R, G, and B, brightness amendment is processed, then, it gets over to R, G, and B primary signal in the video matrix circuit 1, and it constitutes from modulating a luminance signal (Y signal) by the brightness amendment wave signal so that an image may be acquired. Since processing of brightness amendment will already be completed when it gets over to R, G, and B primary signal if a uniformity circuit is constituted as mentioned above, the primary signal of three colors can be led to an output stage as it is, and the amendment circuits 13, 23, and 33 which modulate the primary signal of R, G, and B become unnecessary.
[0054] Since the modulation circuit for brightness amendment can be managed with 1 set as the example 9 described if a uniformity circuit is constituted as mentioned above, the merit that the circuit scale of a uniformity circuit becomes small arises. Moreover, the adjustment method of brightness amendment level can be performed by controlling the amplitude of a brightness amendment wave signal like each above-mentioned example. Furthermore, the liquid crystal projector using this uniformity circuit is applicable to the both sides of a rear mold and a front mold projector.
[0055] Moreover, although drawing 9 shows the example used for 1 lens method liquid crystal projector, also with a 1 lens method CRT projector, it is transposing the liquid crystal panels 14, 24, and 34 of

drawing 9 to CRT 11, 21, and 31 of R, G, and B, and transposing the liquid crystal panel drive circuits 15, 25, and 35 to the CRT output circuits 12, 22, and 32, and the completely same effect as a rear mold and a front mold liquid crystal projector is acquired.

[0056] The example of the uniformity circuit shown in example 15. drawing 11 applies the uniformity circuit stated in the example 6 to a 1 lens method CRT projector, and this drawing is a block diagram of a uniformity circuit including the video circuit in the example. In this drawing, the uniformity circuit 43 consists of a brightness amendment wave signal generating circuit 45 and a G1 drive circuit 44 of CRT of R, G, and B. As the example 6 described this uniformity circuit, the amendment circuits 13, 23, and 33 which modulate the primary signal of R, G, and B become unnecessary, and can use the video circuit used with the conventional projector as it is, and the improvement of the circumference and a pin center,large brightness ratio is attained by a rear mold and the front mold projector like each above-mentioned example.

[0057] Although the uniformity circuit of the rear mold using three CRT or the liquid crystal panel of three sheets as an element which is three lenses or 1 lens method until now [example 16.], and copies R, G, and B image, or a front mold projector has been described There are also the rear mold and front mold projector which copy an image to one color CRT and the liquid crystal panel of one sheet other than these, and carry out expansion projection of the image on a screen with one projection lens among the projectors. Also in these projectors, the brightness of a screen periphery falls under the effect of a projection lens completely like 3CRT and 3 liquid-crystal-panel projector. However, an irregular color is not generated theoretically. Therefore, also in these projectors, by constituting and using the uniformity circuit of 1 lens method projector stated in the examples 13-15, brightness amendment is performed, a hot spot is lost on a screen, and the projector which can attain a uniformity improvement of the image on a screen is obtained.

[0058] in addition, these projectors -- what is necessary is just to transpose the configuration of the uniformity circuit to kick to drawing 8 and the electrochromatic display panel of 14 or 24,341 liquid crystal panels of R, G, and B shown in 9 with a liquid crystal method projector What is necessary is on the other hand, just to transpose CRT 11, 21, and 31 of R, G, and B to one color CRT in drawing 10 and 11 with a CRT method projector.

[0059] About the adjustment method of brightness amendment level as well as each above-mentioned example, it can carry out by controlling the amplitude of a brightness amendment wave signal.

[0060] There is a method of giving a brightness amendment wave signal to G1 of CRT as a method of performing brightness amendment, and the projector of 1CRT can constitute the uniformity circuit by G1 of CRT from the projector of an example 17.CRT method similarly. The example at this time is shown in drawing 12 . In this drawing, CRT to which 61 copies a color image, and 62 are the output circuits of R, G, and B video signal, and 43 is a uniformity circuit which consists of a brightness amendment wave signal generating circuit 45 and a G1 drive circuit 44. In addition, also about the adjustment method of brightness amendment level, it can carry out by controlling the amplitude of a brightness amendment wave signal like each above-mentioned example, and the same effect as each above-mentioned example is acquired.

[0061]

[Effect of the Invention] As mentioned above, while being able to reduce the amount of residual irregular colors of R and B generated on a screen by using the uniformity circuit of this invention, the circumference and a pin center,large brightness ratio are improved, and it is effective in the ability to obtain the rear mold of the 3 lens CRT method which can attain an improvement of uniformity, or 3 lens liquid crystal method, and a front mold video projector. Moreover, in the rear mold of a 1 lens CRT method or 1 lens liquid crystal method, and a front mold video projector, the circumference and a pin center,large brightness ratio are improved, and it is effective in the ability to obtain the projector which can attain an improvement of uniformity.

[Translation done.]

* NOTICES *

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the configuration of a video circuit including the circuit for 3 lens method projectors by the 1st example of this invention.
[Drawing 2] It is the block diagram showing the configuration of a video circuit including the circuit for 3 lens method projectors by the 2nd example of this invention.
[Drawing 3] It is the block diagram showing the configuration of a video circuit including the circuit for 3 lens method projectors by the 3rd example of this invention.
[Drawing 4] It is the block diagram showing the configuration of a video circuit including the circuit for 3 lens method projectors by the 4th example of this invention.
[Drawing 5] It is the block diagram showing the configuration of a video circuit including the circuit for 3 lens method projectors by the 5th example of this invention.
[Drawing 6] It is the block diagram showing the configuration of a video circuit including the circuit for 3 lens method projectors by the 6th example of this invention.
[Drawing 7] It is the block diagram showing the configuration of a video circuit including the circuit for 3 lens method projectors by the 7th example of this invention.
[Drawing 8] It is the block diagram showing the configuration of a video circuit including the circuit for 1 lens method liquid crystal projectors by the 8th example of this invention.
[Drawing 9] It is the block diagram showing the configuration of a video circuit including the circuit for 1 lens method liquid crystal projectors by the 9th example of this invention.
[Drawing 10] It is the block diagram showing the configuration of a video circuit including the uniformity circuit for 1 lens method CRT projectors by the 10th example of this invention.
[Drawing 11] It is the block diagram showing the configuration of a video circuit including the uniformity circuit for 1 lens method CRT projectors by the 11th example of this invention.
[Drawing 12] It is the block diagram showing the configuration of a video circuit including the uniformity circuit for 1 lens method CRT projectors by the 12th example of this invention.
[Drawing 13] It is drawing showing the 1st example of the configuration of the primary signal modulating stage of the video amendment circuit of R, G, and B in this invention.
[Drawing 14] It is drawing showing the 2nd example of the configuration of the primary signal modulating stage of the video amendment circuit of R, G, and B in this invention.
[Drawing 15] It is drawing showing the 3rd example of the configuration of the primary signal modulating stage of the video amendment circuit of R in this invention, and B.
[Drawing 16] It is drawing showing the 4th example of the configuration of the primary signal modulating stage of the video amendment circuit of R in this invention, and B.
[Drawing 17] It is the block diagram showing the configuration of a video circuit without the uniformity circuit used with the conventional CRT projector.
[Drawing 18] In the conventional rear mold video projector, it is drawing showing the illumination distribution of R normalized to the illuminance of G on the screen when using the conventional optical system.
 [Drawing 19] In the conventional rear mold video projector, it is drawing showing the

illumination distribution of R normalized to the illuminance of G on the screen when using the optical system which mitigated the residual irregular color.
[Drawing 20] In the conventional rear mold video projector, it is drawing showing the luminance distribution on a screen.
[Description of Notations]
1 Video Matrix Circuit
2 Multiplication Circuit (for Amendment Signal Creation)
3 Multiplication Circuit (for Primary Signal Modulation)
4 Adder Circuit
11 R-CRT
12 R Output Circuit
13 R Amendment Circuit
14 R-Liquid Crystal Panel
15 R-Liquid Crystal Panel Drive Circuit
16 R Amendment Wave Signal Creation Circuit
21 G-CRT
22 G Output Circuit
23 G Amendment Circuit
24 G-Liquid Crystal Panel
25 G-Liquid Crystal Panel Drive Circuit
26 G Amendment Wave Signal Creation Circuit
31 B-CRT
32 B Output Circuit
33 B Amendment Circuit
34 B-Liquid Crystal Panel
35 B-Liquid Crystal Panel Drive Circuit
36 B Amendment Wave Signal Creation Circuit
40 Irregular Color, Brightness Amendment Wave Signal Generating Circuit
41 Irregular Color Amendment Circuit
42 Brightness Amendment Circuit
43 Uniformity Circuit
44 G1 Drive Circuit
45 Brightness Amendment Wave Signal Generating Circuit
46 Irregular Color Amendment Wave Signal Generating Circuit
51 A/D-Conversion Circuit
52 Video Signal Processing Circuit
53 D/A Conversion Circuit
61 Color CRT
62 R, G, B Output Circuit

[Translation done.]

* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] A video circuit of R and G which are characterized by providing the following, a CRT method rear mold video projector which carries out R, G, and B monochrome image at a counterpart, carries out expansion projection of the image on a screen with three projection lenses at B3CRT, respectively, and acquires a color image, or a CRT method front projection mold video projector An irregular color amendment wave signal generation means of a primary signal of R and B R, G, a brightness amendment wave signal generation means of B three-primary-colors signal A means to create R, G, and each amendment wave signal of B three primary colors from an output amendment wave signal of both the above-mentioned amendment wave generating means A means by which addition with an output signal of a means to create a video amendment signal of R, G, and B primary signal from an output signal of the above-mentioned amendment wave signal creation means, and each video amendment signal creation means of the above R, G, and B, and R, G and B three-primary-colors signal performs amendment of R, G, and B three-primary-colors signal
[Claim 2] A video circuit of R and G which are characterized by providing the following, a CRT method rear mold video projector which carries out R, G, and B monochrome image at a counterpart, carries out expansion projection of the image on a screen with three projection lenses at B3CRT, respectively, and acquires a color image, or a CRT method front projection mold video projector An irregular color amendment wave signal generation means of a primary signal of R and B R, G, a brightness amendment wave signal generation means of B three-primary-colors signal A means to create R, G, and each amendment wave signal of B three primary colors from an output amendment wave signal of both the above-mentioned amendment wave generating means A means to create an amendment signal of R, G, and B from an output signal of the above-mentioned amendment wave signal creation means, and a means by which an output signal of each amendment signal creation means of the above R, G, and B performs a modulation of R, G, and B three-primary-colors signal
[Claim 3] A video circuit of R and G which are characterized by providing the following, a CRT method rear mold video projector which carries out R, G, and B monochrome image at a counterpart, carries out expansion projection of the image on a screen with three projection lenses at B3CRT, respectively, and acquires a color image, or a CRT method front projection mold video projector An irregular color amendment wave signal generation means of a primary signal of R and B R, G, a brightness amendment wave signal generation means of B three-primary-colors signal A means which becomes irregular about R and B primary signal with an output signal of the above-mentioned irregular color amendment wave signal generation means A means to modulate an output signal of the above-mentioned irregular color amendment modulation means of R and B with an output signal of a brightness amendment wave signal generation means of the above R and B, and a means which becomes irregular about a primary signal of G with an output signal of a brightness amendment wave signal generation means of the above G
[Claim 4] R, G, a CRT method rear mold video projector that carries out R, G, and B monochrome image at a counterpart, carries out expansion projection of the image on a screen with three projection lenses at B3CRT, respectively, and acquires a color image, In a CRT method front projection mold

video projector Or R, G, and a brightness amendment wave signal generation means of B three-primary-colors signal, A video circuit equipped with a means to modulate R, G, and B three-primary-colors signal, respectively with an output signal of the above-mentioned brightness amendment wave signal generation means, A uniformity circuit characterized by constituting by G1 drive circuit for giving an output signal of the above-mentioned brightness amendment wave signal generation means to G1 of an irregular color amendment wave signal generation means of R and B primary signal, and two CRT for R and B.

[Claim 5] A video circuit of R and G which are characterized by providing the following, a CRT method rear mold video projector which carries out R, G, and B monochrome image at a counterpart, carries out expansion projection of the image on a screen with three projection lenses at B3CRT, respectively, and acquires a color image, or a CRT method front projection mold video projector A generating means of a brightness amendment wave signal for modulating a video signal before getting over to R, G, and B primary signal A means which modulates a video signal before a recovery with an output signal of the above-mentioned signal generation means A matrix circuit which restores to an output video signal of the above-mentioned modulation means to R, G, and B primary signal An irregular color amendment wave signal generation means of R and B primary signal, and a means to modulate R and B primary signal with an output signal of the above-mentioned irregular color amendment wave signal generation means

[Claim 6] A video circuit of R and G which are characterized by providing the following, a CRT method rear mold video projector which carries out R, G, and B monochrome image at a counterpart, carries out expansion projection of the image on a screen with three projection lenses at B3CRT, respectively, and acquires a color image, or a CRT method front projection mold video projector A means to change a video signal before getting over to R, G, and B primary signal into a digital video signal R, G, recovery processing to B primary signal, R, irregular color amendment processing of B primary signal and R and G, a data-processing means by which data processing of a digital video signal performs brightness amendment signal processing of B three-primary-colors signal A means to change digital one R, G, and B primary signal into analogs R and G and B primary signal

[Claim 7] A color image to one color CRT characterized by providing the following A counterpart, A 1 lens method 1CRT method rear mold video projector which carries out expansion projection of the image on a screen with one projection lens, and acquires a color image, A color image to a 1CRT method front projection mold video projector or a liquid crystal panel of one sheet Or a counterpart, A video circuit of 1 lens method liquid crystal method rear mold video projector which carries out expansion projection of the image on a screen with one projection lens, and acquires a color image, or a front projection mold video projector R, G, a brightness amendment wave signal generation means of B three-primary-colors signal A means to modulate R, G, and B three-primary-colors signal with an output signal of the above-mentioned amendment wave signal generation means

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[Translation done.]

* NOTICES *

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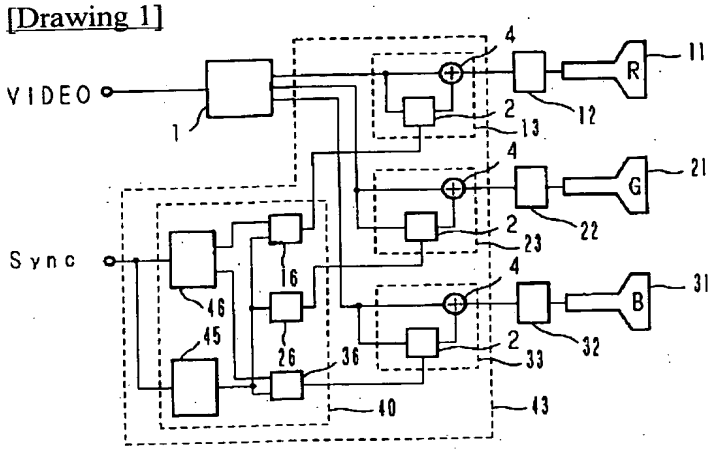
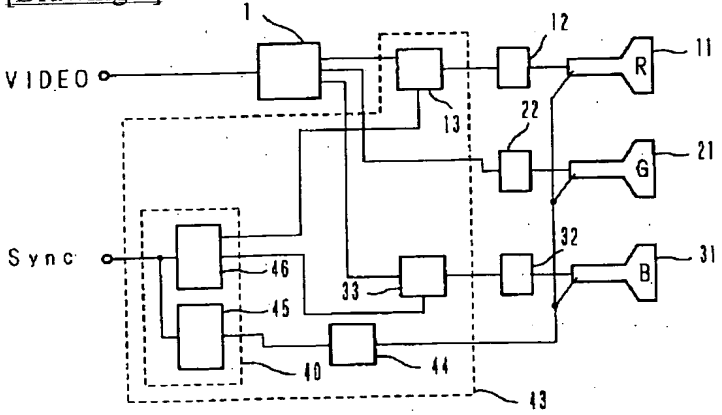
DRAWINGS

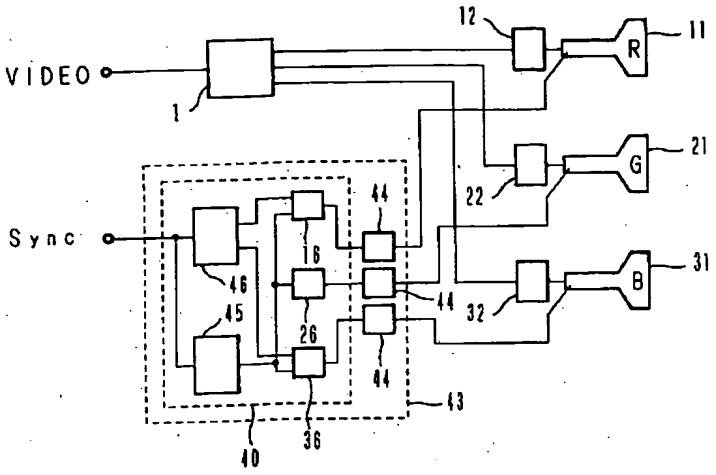
[Drawing 1]



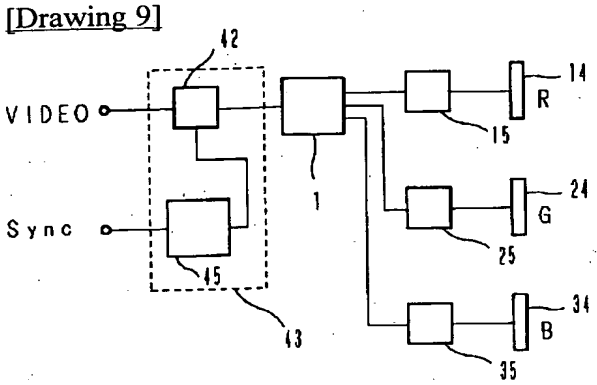
[Drawing 2]



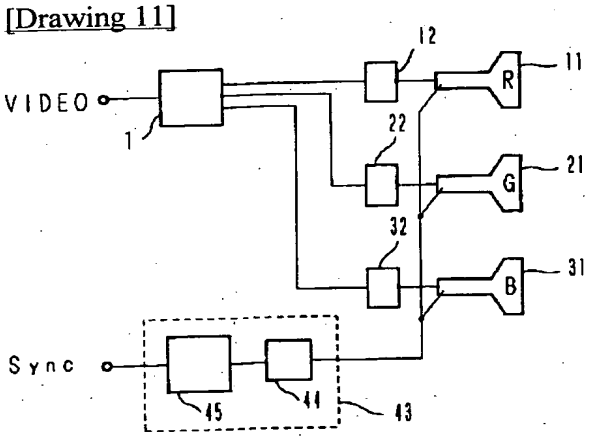
[Drawing 3]



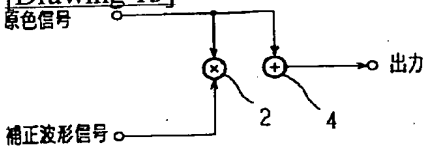
[Drawing 9]



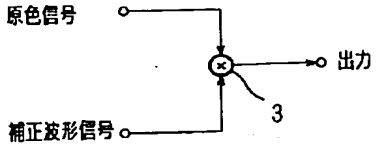
[Drawing 11]



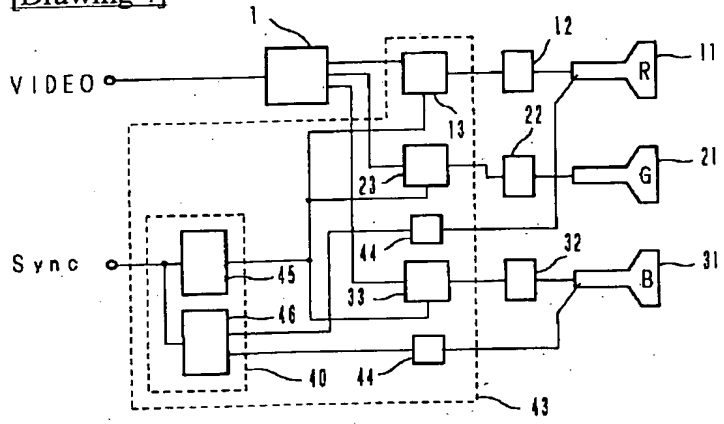
[Drawing 13]



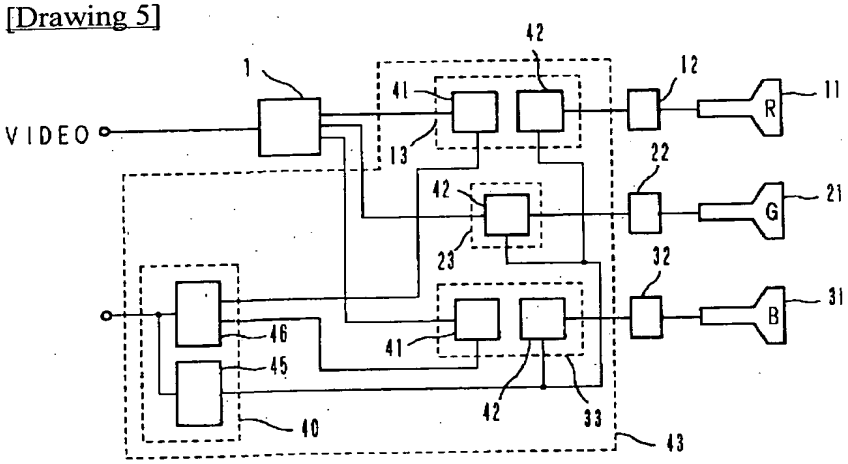
[Drawing 14]



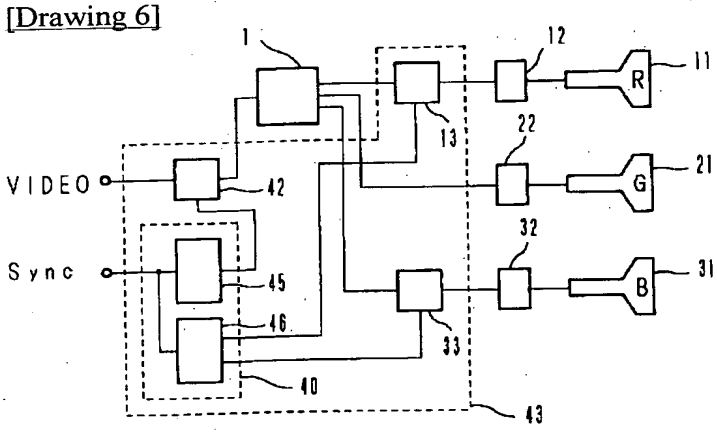
[Drawing 4]



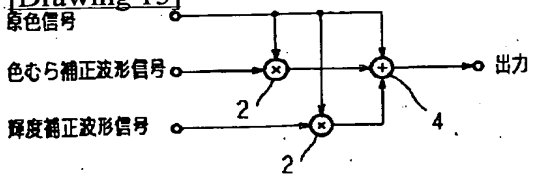
[Drawing 5]



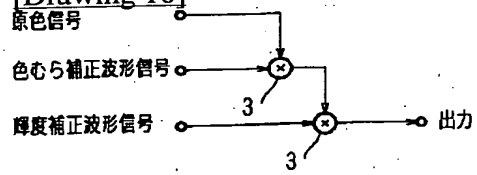
[Drawing 6]



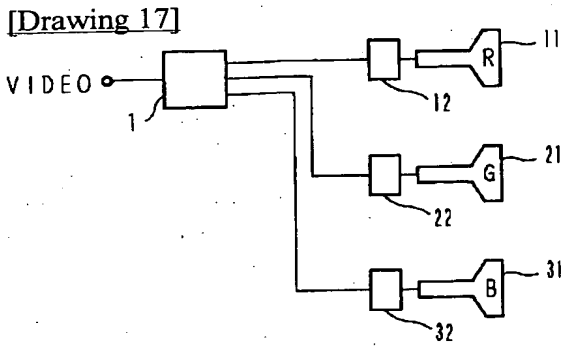
[Drawing 15]



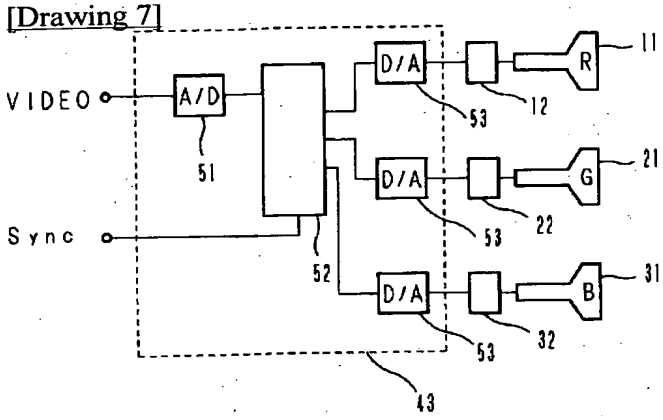
[Drawing 16]



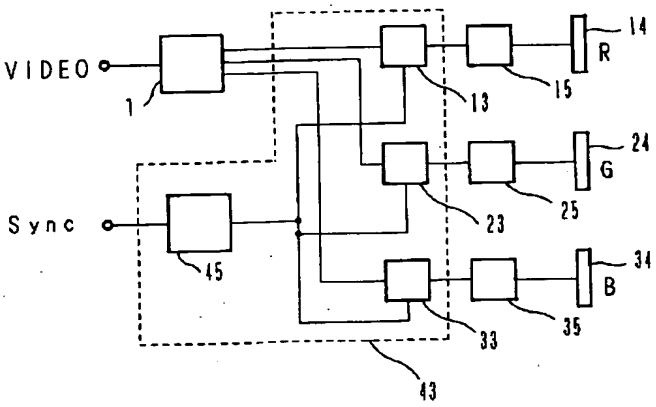
[Drawing 17]



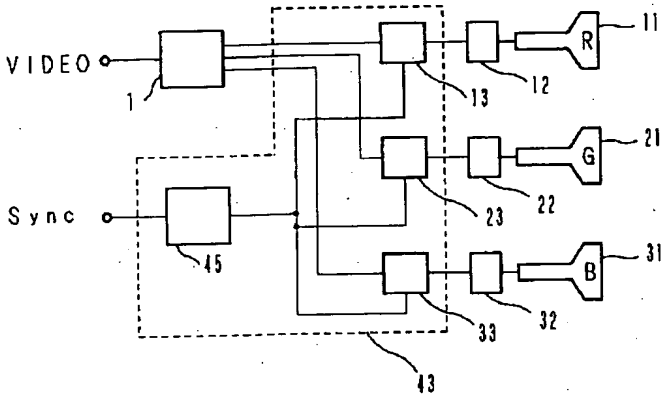
[Drawing 7]



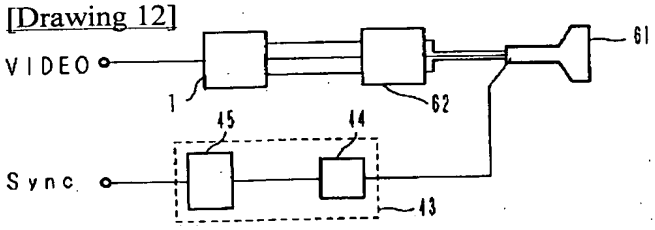
[Drawing 8]



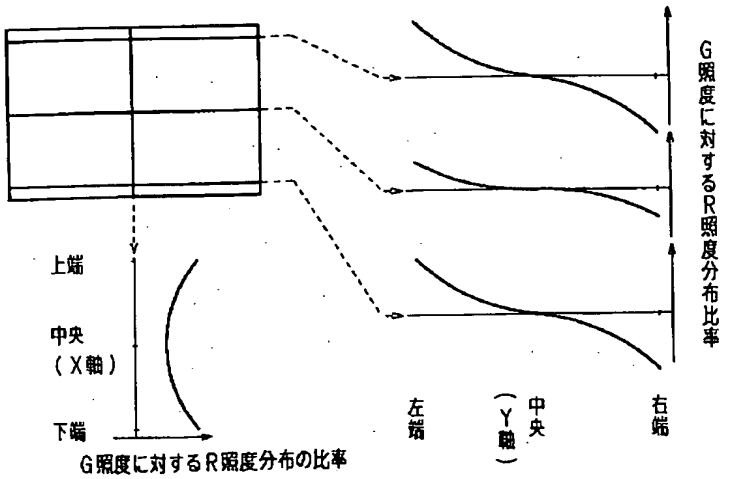
[Drawing 10]



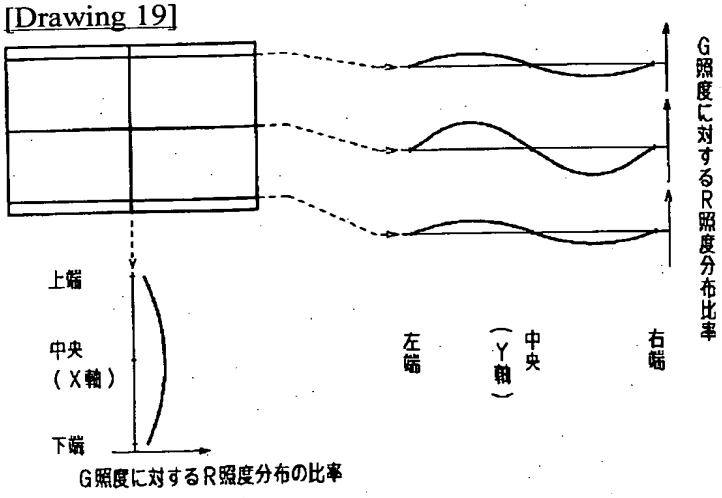
[Drawing 12]



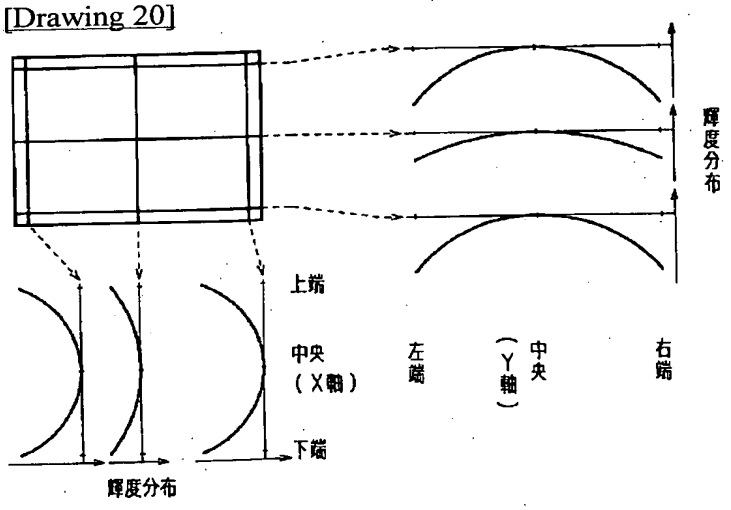
[Drawing 18]



[Drawing 19]



[Drawing 20]



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